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<p>(21) International Application Number: PCT/US96/17480 (22) International Filing Date: 25 October 1996 (25.10.96) (30) Priority Data: 60/005,974 26 October 1995 (26.10.95) US 08/584,040 11 January 1996 (11.01.96) US (71) Applicants: RIBOZYME PHARMACEUTICALS, INC. [US/US]; 2950 Wilderness Place, Boulder, CO 80301 (US). CHIRON CORPORATION [US/US]; 4560 Horton Street, Emeryville, CA 94608 (US). (72) Inventors: PAVCO, Pamela; 705 Barberry Circle, Lafayette, CO 80026 (US). McSWIGGEN, James; 4866 Franklin Drive, Boulder, CO 80301 (US). STINCHCOMB, Dan; 7203 Old Post Road, Boulder, CO 80301 (US). ESCOBEDO, Jaime; 1470 Livorna Road, Alamo, CA 94507 (US). (74) Agents: HELLENKAMP, Amy, S. et al.; Lyon & Lyon L.L.P., Suite 4700, 633 West Fifth Street, Los Angeles, CA 90071- 2066 (US).</p>	<p>(81) Designated States: AU, CA, JP, MX, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>Without international search report and to be republished upon receipt of that report.</i></p>	
<p>(54) Title: METHOD AND REAGENT FOR THE TREATMENT OF DISEASES OR CONDITIONS RELATED TO LEVELS OF VASCULAR ENDOTHELIAL GROWTH FACTOR RECEPTOR (57) Abstract Nucleic acid molecule which modulates the synthesis, expression and/or stability of an mRNA encoding one or more receptors of vascular endothelial growth factor.</p>		

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DESCRIPTIONMethod and Reagent for the Treatment of Diseases or
Conditions Related to Levels of Vascular Endothelial
Growth Factor ReceptorBackground Of The Invention

This application is a continuation-in-part of Pavco et al., U.S. Serial No. 60/005,974 all of which is hereby incorporated by reference herein (including drawings).

5 This invention relates to methods and reagents for the treatment of diseases or conditions relating to the levels of expression of vascular endothelial growth factor (VEGF) receptor(s).

10 The following is a discussion of relevant art, none of which is admitted to be prior art to the present invention.

VEGF, also referred to as vascular permeability factor (VPF) and vasculotropin, is a potent and highly specific mitogen of vascular endothelial cells (for a
15 review see Ferrara, 1993 Trends Cardiovas. Med. 3, 244; Neufeld et al., 1994 Prog. Growth Factor Res. 5, 89). VEGF induced neovascularization is implicated in various pathological conditions such as tumor angiogenesis, proliferative diabetic retinopathy, hypoxia-induced
20 angiogenesis, rheumatoid arthritis, psoriasis, wound healing and others.

VEGF, an endothelial cell-specific mitogen, is a 34-45 kDa glycoprotein with a wide range of activities that include promotion of angiogenesis, enhancement of
25 vascular-permeability and others. VEGF belongs to the platelet-derived growth factor (PDGF) family of growth factors with approximately 18% homology with the A and B chain of PDGF at the amino acid level. Additionally, VEGF contains the eight conserved cysteine residues common to
30 all growth factors belonging to the PDGF family (Neufeld et al., supra). VEGF protein is believed to exist

predominantly as disulfide-linked homodimers; monomers of VEGF have been shown to be inactive (Plouet et al., 1989 *EMBO J.* 8, 3801).

VEGF exerts its influence on vascular endothelial cells by binding to specific high-affinity cell surface receptors. Covalent cross-linking experiments with ¹²⁵I-labeled VEGF protein have led to the identification of three high molecular weight complexes of 225, 195 and 175 kDa presumed to be VEGF and VEGF receptor complexes (Vaisman et al., 1990 *J. Biol. Chem.* 265, 19461). Based on these studies VEGF-specific receptors of 180, 150 and 130 kDa molecular mass were predicted. In endothelial cells, receptors of 150 and the 130 kDa have been identified. The VEGF receptors belong to the superfamily of receptor tyrosine kinases (RTKs) characterized by a conserved cytoplasmic catalytic kinase domain and a hydrophylic kinase sequence. The extracellular domains of the VEGF receptors consist of seven immunoglobulin-like domains that are thought to be involved in VEGF binding functions.

The two most abundant and high-affinity receptors of VEGF are flt-1 (*fms*-like tyrosine kinase) cloned by Shibuya et al., 1990 *Oncogene* 5, 519 and KDR (kinase-insert-domain-containing receptor) cloned by Terman et al., 1991 *Oncogene* 6, 1677. The murine homolog of KDR, cloned by Mathews et al., 1991, *Proc. Natl. Acad. Sci., USA*, 88, 9026, shares 85% amino acid homology with KDR and is termed as flk-1 (fetal liver kinase-1). Recently it has been shown that the high-affinity binding of VEGF to its receptors is modulated by cell surface-associated heparin and heparin-like molecules (Gitay-Goren et al., 1992 *J. Biol. Chem.* 267, 6093).

VEGF expression has been associated with several pathological states such as tumor angiogenesis, several forms of blindness, rheumatoid arthritis, psoriasis and others. Following is a brief summary of evidence supporting the involvement of VEGF in various diseases:

1) Tumor angiogenesis: Increased levels of VEGF gene expression have been reported in vascularized and edema-associated brain tumors (Berkman et al., 1993 *J. Clin. Invest.* 91, 153). A more direct demonstration of the role of VEGF in tumor angiogenesis was demonstrated by Jim Kim et al., 1993 *Nature* 362, 841 wherein, monoclonal antibodies against VEGF were successfully used to inhibit the growth of rhabdomyosarcoma, glioblastoma multiforme cells in nude mice. Similarly, expression of a dominant negative mutated form of the flt-1 VEGF receptor inhibits vascularization induced by human glioblastoma cells in nude mice (Millauer et al., 1994, *Nature* 367, 576).

2) Ocular diseases: Aiello et al., 1994 *New Engl. J. Med.* 331, 1480, showed that the ocular fluid, of a majority of patients suffering from diabetic retinopathy and other retinal disorders, contains a high concentration of VEGF. Miller et al., 1994 *Am. J. Pathol.* 145, 574, reported elevated levels of VEGF mRNA in patients suffering from retinal ischemia. These observations support a direct role for VEGF in ocular diseases.

3) Psoriasis: Detmar et al., 1994 *J. Exp. Med.* 180, 1141 reported that VEGF and its receptors were over-expressed in psoriatic skin and psoriatic dermal microvessels, suggesting that VEGF plays a significant role in psoriasis.

4) Rheumatoid arthritis: Immunohistochemistry and *in situ* hybridization studies on tissues from the joints of patients suffering from rheumatoid arthritis show an increased level of VEGF and its receptors (Fava et al., 1994 *J. Exp. Med.* 180, 341). Additionally, Koch et al., 1994 *J. Immunol.* 152, 4149, found that VEGF-specific antibodies were able to significantly reduce the mitogenic activity of synovial tissues from patients suffering from rheumatoid arthritis. These observations support a direct role for VEGF in rheumatoid arthritis.

In addition to the above data on pathological conditions involving excessive angiogenesis, a number of

studies have demonstrated that VEGF is both necessary and sufficient for neovascularization. Takashita et al., 1995 *J. Clin. Invest.* 93, 662, demonstrated that a single injection of VEGF augmented collateral vessel development in a rabbit model of ischemia. VEGF also can induce neovascularization when injected into the cornea. Expression of the VEGF gene in CHO cells is sufficient to confer tumorigenic potential to the cells. Kim et al., *supra* and Millauer et al., *supra* used monoclonal antibodies against VEGF or a dominant negative form of flk-1 receptor to inhibit tumor-induced neovascularization.

During development, VEGF and its receptors are associated with regions of new vascular growth (Millauer et al., 1993 *Cell* 72, 835; Shalaby et al., 1993 *J. Clin. Invest.* 91, 2235). Furthermore, transgenic mice lacking either of the VEGF receptors are defective in blood vessel formation, in fact these mice do not survive; flk-1 appears to be required for differentiation of endothelial cells, whileflt-1 appears to be required at later stages of vessel formation (Shalaby et al., 1995 *Nature* 376, 62; Fung et al., 1995 *Nature* 376, 66). Thus, these receptors must be present to properly signal endothelial cells or their precursors to respond to vascularization-promoting stimuli.

All of the conditions listed above, involve extensive vascularization. This hyper-stimulation of endothelial cells may be alleviated by VEGF antagonists. Thus most of the therapeutic efforts for the above conditions have concentrated on finding inhibitors of the VEGF protein.

Kim et al., 1993 *Nature* 362, 841 have been successful in inhibiting VEGF-induced tumor growth and angiogenesis in nude mice by treating the mice with VEGF-specific monoclonal antibody.

Koch et al., 1994 *J. Immunol.* 152, 4149 showed that the mitogenic activity of microvascular endothelial cells found in rheumatoid arthritis (RA) synovial tissue explants and the chemotactic property of endothelial cells

from RA synovial fluid can be neutralized significantly by treatment with VEGF-specific antibodies.

Ullrich et al., International PCT Publication No. WO 94/11499 and Millauer et al., 1994 Nature 367, 576 used a
5 soluble form of flk-1 receptor (dominant-negative mutant) to prevent VEGF-mediated tumor angiogenesis in immunodeficient mice.

Kendall and Thomas, International PCT Publication No. WO 94/21679 describe the use of naturally occurring or
10 recombinantly-engineered soluble forms of VEGF receptors to inhibit VEGF activity.

Robinson, International PCT Publication No. WO 95/04142 describes the use of antisense oligonucleotides targeted against VEGF RNA to inhibit VEGF expression.

15 Jellinek et al., 1994 Biochemistry 33, 10450 describe the use of VEGF-specific high-affinity RNA aptamers to inhibit the binding of VEGF to its receptors.

Rockwell and Goldstein, International PCT Publication No. WO 95/21868, describe the use of anti-VEGF receptor
20 monoclonal antibodies to neutralize the the effect of VEGF on endothelial cells.

Summary Of The Invention

The invention features novel nucleic acid-based techniques [e.g., enzymatic nucleic acid molecules
25 (ribozymes), antisense nucleic acids, 2-5A antisense chimeras, triplex DNA, antisense nucleic acids containing RNA cleaving chemical groups (Cook et al., U.S. Patent 5,359,051)] and methods for their use to down regulate or inhibit the expression of receptors of VEGF (VEGF-R).

30 In a preferred embodiment, the invention features use of one or more of the nucleic acid-based techniques to inhibit the expression of flt-1 and/or flk-1/KDR receptors.

By "inhibit" it is meant that the activity of VEGF-R or level of mRNAs or equivalent RNAs encoding VEGF-R is
35 reduced below that observed in the absence of the nucleic acid. In one embodiment, inhibition with ribozymes

preferably is below that level observed in the presence of an enzymatically inactive RNA molecule that is able to bind to the same site on the mRNA, but is unable to cleave that RNA. In another embodiment, inhibition with anti-sense oligonucleotides is preferably below that level observed in the presence of for example, an oligonucleotide with scrambled sequence or with mismatches.

By "enzymatic nucleic acid molecule" it is meant an RNA molecule which has complementarity in a substrate binding region to a specified gene target, and also has an enzymatic activity which is active to specifically cleave target RNA. That is, the enzymatic RNA molecule is able to intermolecularly cleave RNA and thereby inactivate a target RNA molecule. This complementary regions allow sufficient hybridization of the enzymatic RNA molecule to the target RNA and thus permit cleavage. One hundred percent complementarity is preferred, but complementarity as low as 50-75% may also be useful in this invention. By "equivalent" RNA to VEGF-R is meant to include those naturally occurring RNA molecules in various animals, including human, mice, rats, rabbits, primates and pigs.

By "antisense nucleic acid" it is meant a non-enzymatic nucleic acid molecule that binds to target RNA by means of RNA-RNA or RNA-DNA or RNA-PNA (protein nucleic acid; Egholm et al., 1993 Nature 365, 566) interactions and alters the activity of the target RNA (for a review see Stein and Cheng, 1993 Science 261, 1004).

By "2-5A antisense chimera" it is meant, an antisense oligonucleotide containing a 5' phosphorylated 2'-5'-linked adenylate residues. These chimeras bind to target RNA in a sequence-specific manner and activate a cellular 2-5A-dependent ribonuclease which, in turn, cleaves the target RNA (Torrence et al., 1993 Proc. Natl. Acad. Sci. USA 90, 1300).

By "triplex DNA" it is meant an oligonucleotide that can bind to a double-stranded DNA in a sequence-specific manner to form a triple-strand helix. Formation of such

triple helix structure has been shown to inhibit transcription of the targeted gene (Duval-Valentin et al., 1992 *Proc. Natl. Acad. Sci. USA* 89, 504).

By "gene" it is meant a nucleic acid that encodes an
5 RNA.

By "complementarity" it is meant a nucleic acid that can form hydrogen bond(s) with other RNA sequence by either traditional Watson-Crick or other non-traditional types (for example, Hoogsteen type) of base-paired
10 interactions.

Six basic varieties of naturally-occurring enzymatic RNAs are known presently. Each can catalyze the hydrolysis of RNA phosphodiester bonds in trans (and thus can cleave other RNA molecules) under physiological conditions. Table I summarizes some of the characteristics of
15 these ribozymes. In general, enzymatic nucleic acids act by first binding to a target RNA. Such binding occurs through the target binding portion of a enzymatic nucleic acid which is held in close proximity to an enzymatic
20 portion of the molecule that acts to cleave the target RNA. Thus, the enzymatic nucleic acid first recognizes and then binds a target RNA through complementary base-pairing, and once bound to the correct site, acts enzymatically to cut the target RNA. Strategic cleavage
25 of such a target RNA will destroy its ability to direct synthesis of an encoded protein. After an enzymatic nucleic acid has bound and cleaved its RNA target, it is released from that RNA to search for another target and can repeatedly bind and cleave new targets. Thus, a
30 single ribozyme molecule is able to cleave many molecules of target RNA. In addition, the ribozyme is a highly specific inhibitor of gene expression, with the specificity of inhibition depending not only on the base-pairing mechanism of binding to the target RNA, but also on the
35 mechanism of target RNA cleavage. Single mismatches, or base-substitutions, near the site of cleavage can completely eliminate catalytic activity of a ribozyme.

Ribozymes that cleave the specified sites in VEGF-R mRNAs represent a novel therapeutic approach to treat tumor angiogenesis, ocular diseases, rheumatoid arthritis, psoriasis and others. Applicant indicates that ribozymes
5 are able to inhibit the activity of VEGF-R (specifically flt-1 and flk-1/KDR) and that the catalytic activity of the ribozymes is required for their inhibitory effect. Those of ordinary skill in the art will find that it is clear from the examples described that other ribozymes
10 that cleave VEGF-R mRNAs may be readily designed and are within the invention.

In preferred embodiments of this invention, the enzymatic nucleic acid molecule is formed in a hammerhead or hairpin motif, but may also be formed in the motif of
15 a hepatitis delta virus, group I intron or RNaseP RNA (in association with an RNA guide sequence) or *Neurospora* VS RNA. Examples of such hammerhead motifs are described by Rossi et al., 1992, *AIDS Research and Human Retroviruses* 8, 183, of hairpin motifs by Hampel et al., EP0360257,
20 Hampel and Tritz, 1989 *Biochemistry* 28, 4929, and Hampel et al., 1990 *Nucleic Acids Res.* 18, 299, and an example of the hepatitis delta virus motif is described by Perrotta and Been, 1992 *Biochemistry* 31, 16; of the RNaseP motif by Guerrier-Takada et al., 1983 *Cell* 35, 849, *Neurospora* VS
25 RNA ribozyme motif is described by Collins (Saville and Collins, 1990 *Cell* 61, 685-696; Saville and Collins, 1991 *Proc. Natl. Acad. Sci. USA* 88, 8826-8830; Collins and Olive, 1993 *Biochemistry* 32, 2795-2799) and of the Group I intron by Cech et al., U.S. Patent 4,987,071. These
30 specific motifs are not limiting in the invention and those skilled in the art will recognize that all that is important in an enzymatic nucleic acid molecule of this invention is that it has a specific substrate binding site which is complementary to one or more of the target gene
35 RNA regions, and that it have nucleotide sequences within or surrounding that substrate binding site which impart an RNA cleaving activity to the molecule.

In a preferred embodiment the invention provides a method for producing a class of enzymatic cleaving agents which exhibit a high degree of specificity for the RNA of a desired target. The enzymatic nucleic acid molecule is
5 preferably targeted to a highly conserved sequence region of target mRNAs encoding VEGF-R proteins (specifically flt-1 and flk-1/KDR) such that specific treatment of a disease or condition can be provided with either one or several enzymatic nucleic acids. Such enzymatic nucleic
10 acid molecules can be delivered exogenously to specific tissue or cellular targets as required. Alternatively, the ribozymes can be expressed from DNA and/or RNA vectors that are delivered to specific cells.

Synthesis of nucleic acids greater than 100 nucleotides in length is difficult using automated methods, and the therapeutic cost of such molecules is prohibitive. In this invention, small nucleic acid motifs (e.g., antisense oligonucleotides, hammerhead or the hairpin ribozymes) are used for exogenous delivery. The simple structure of
20 these molecules increases the ability of the nucleic acid to invade targeted regions of the mRNA structure. However, these nucleic acid molecules can also be expressed within cells from eukaryotic promoters (e.g., Izant and Weintraub, 1985 *Science* 229, 345; McGarry and
25 Lindquist, 1986 *Proc. Natl. Acad. Sci. USA* 83, 399; Sullenger-Scanlon et al., 1991, *Proc. Natl. Acad. Sci. USA*, 88, 10591-5; Kashani-Sabet et al., 1992 *Antisense Res. Dev.*, 2, 3-15; Dropulic et al., 1992 *J. Virol*, 66, 1432-41; Weerasinghe et al., 1991 *J. Virol*, 65, 5531-4;
30 Ojwang et al., 1992 *Proc. Natl. Acad. Sci. USA* 89, 10802-6; Chen et al., 1992 *Nucleic Acids Res.*, 20, 4581-9; Sarver et al., 1990 *Science* 247, 1222-1225; Thompson et al., 1995 *Nucleic Acids Res.* 23, 2259). Those skilled in the art realize that any nucleic acid can be expressed in
35 eukaryotic cells from the appropriate DNA/RNA vector. The activity of such nucleic acids can be augmented by their release from the primary transcript by a ribozyme (Draper

et al., PCT WO93/23569, and Sullivan et al., PCT WO94/02595, both hereby incorporated in their totality by reference herein; Ohkawa et al., 1992 Nucleic Acids Symp. Ser., 27, 15-6; Taira et al., 1991, Nucleic Acids Res., 19, 5125-30; Ventura et al., 1993 Nucleic Acids Res., 21, 3249-55; Chowrira et al., 1994 J. Biol. Chem. 269, 25856).

Such nucleic acids are useful for the prevention of the diseases and conditions discussed above, and any other diseases or conditions that are related to the levels of VEGF-R (specifically flt-1 and flk-1/KDR) in a cell or tissue.

By "related" is meant that the reduction of VEGF-R (specifically flt-1 and flk-1/KDR) RNA levels and thus reduction in the level of the respective protein will relieve, to some extent, the symptoms of the disease or condition.

Ribozymes are added directly, or can be complexed with cationic lipids, packaged within liposomes, or otherwise delivered to target cells or tissues. The nucleic acid or nucleic acid complexes can be locally administered to relevant tissues ex vivo, or in vivo through injection, infusion pump or stent, with or without their incorporation in biopolymers. In preferred embodiments, the ribozymes have binding arms which are complementary to the sequences in Tables II to IX. Examples of such ribozymes also are shown in Tables II to IX. Examples of such ribozymes consist essentially of sequences defined in these Tables. By "consists essentially of" is meant that the active ribozyme contains an enzymatic center equivalent to those in the examples, and binding arms able to bind mRNA such that cleavage at the target site occurs. Other sequences may be present which do not interfere with such cleavage.

In another aspect of the invention, ribozymes that cleave target RNA molecules and inhibit VEGF-R (specifically flt-1 and flk-1/KDR) activity are expressed from transcription units inserted into DNA or RNA vectors. The

recombinant vectors are preferably DNA plasmids or viral vectors. Ribozyme expressing viral vectors could be constructed based on, but not limited to, adeno-associated virus, retrovirus, adenovirus, or alphavirus. Preferably, the recombinant vectors capable of expressing the ribozymes are delivered as described above, and persist in target cells. Alternatively, viral vectors may be used that provide for transient expression of ribozymes. Such vectors might be repeatedly administered as necessary. Once expressed, the ribozymes cleave the target mRNA. Delivery of ribozyme expressing vectors could be systemic, such as by intravenous or intramuscular administration, by administration to target cells ex-planted from the patient followed by reintroduction into the patient, or by any other means that would allow for introduction into the desired target cell.

By "vectors" is meant any nucleic acid- and/or viral-based technique used to deliver a desired nucleic acid.

Other features and advantages of the invention will be apparent from the following description of the preferred embodiments thereof, and from the claims.

Description Of The Preferred Embodiments

First the drawings will be described briefly.

Drawings

Figure 1 is a diagrammatic representation of the hammerhead ribozyme domain known in the art. Stem II can be ≥ 2 base-pair long.

Figure 2a is a diagrammatic representation of the hammerhead ribozyme domain known in the art; Figure 2b is a diagrammatic representation of the hammerhead ribozyme as divided by Uhlenbeck (1987, *Nature*, 327, 596-600) into a substrate and enzyme portion; Figure 2c is a similar diagram showing the hammerhead divided by Haseloff and Gerlach (1988, *Nature*, 334, 585-591) into two portions; and Figure 2d is a similar diagram showing the hammerhead

divided by Jeffries and Symons (1989, *Nucl. Acids. Res.*, 17, 1371-1371) into two portions.

Figure 3 is a diagrammatic representation of the general structure of a hairpin ribozyme. Helix 2 (H2) is provided with a least 4 base pairs (i.e., n is 1, 2, 3 or 4) and helix 5 can be optionally provided of length 2 or more bases (preferably 3 - 20 bases, i.e., m is from 1 - 20 or more). Helix 2 and helix 5 may be covalently linked by one or more bases (i.e., r is ≥ 1 base). Helix 1, 4 or 5 may also be extended by 2 or more base pairs (e.g., 4 - 20 base pairs) to stabilize the ribozyme structure, and preferably is a protein binding site. In each instance, each N and N' independently is any normal or modified base and each dash represents a potential base-pairing interaction. These nucleotides may be modified at the sugar, base or phosphate. Complete base-pairing is not required in the helices, but is preferred. Helix 1 and 4 can be of any size (i.e., o and p is each independently from 0 to any number, e.g., 20) as long as some base-pairing is maintained. Essential bases are shown as specific bases in the structure, but those in the art will recognize that one or more may be modified chemically (abasic, base, sugar and/or phosphate modifications) or replaced with another base without significant effect. Helix 4 can be formed from two separate molecules, i.e., without a connecting loop. The connecting loop when present may be a ribonucleotide with or without modifications to its base, sugar or phosphate. " q " is ≥ 2 bases. The connecting loop can also be replaced with a non-nucleotide linker molecule. H refers to bases A, U, or C. Y refers to pyrimidine bases. "_____" refers to a covalent bond.

Figure 4 is a representation of the general structure of the hepatitis delta virus ribozyme domain known in the art.

Figure 5 is a representation of the general structure of the VS RNA ribozyme domain.

Figure 6 is a schematic representation of an RNaseH accessibility assay. Specifically, the left side of Figure 6 is a diagram of complementary DNA oligonucleotides bound to accessible sites on the target RNA.

5 Complementary DNA oligonucleotides are represented by broad lines labeled A, B, and C. Target RNA is represented by the thin, twisted line. The right side of Figure 6 is a schematic of a gel separation of uncut target RNA from a cleaved target RNA. Detection of target
10 RNA is by autoradiography of body-labeled, T7 transcript. The bands common to each lane represent uncleaved target RNA; the bands unique to each lane represent the cleaved products.

Figure 7 shows the effect of hammerhead ribozymes
15 targeted against flt-1 receptor on the binding of VEGF to the surface of human microvascular endothelial cells. Sequences of the ribozymes used are shown in Table II; the length of stem II region is 3 bp. The hammerhead ribozymes were chemically modified such that the ribozyme
20 consists of ribose residues at five positions (see Figure 11); U4 and U7 positions contain 2'-NH₂ modifications, the remaining nucleotide positions contain 2'-O-methyl substitutions; four nucleotides at the 5' terminus contains phosphorothioate substitutions. Additionally, the 3' end
25 of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose. The results of two separate experiments are shown as separate bars for each set. Each bar represents the average of triplicate samples. The standard deviation is shown with error bars. For the flt-1 data, 500 nM
30 ribozyme (3:1 charge ratio with LipofectAMINE®) was used. Control 1-10 is the control for ribozymes 307-2797, control 11-20 is the control for ribozymes 3008-5585. The Control 1-10 and Control 11-20 represent the treatment of cells with LipofectAMINE® alone without any ribozymes.

35 Figure 8 shows the effect of hammerhead ribozymes targeted against KDR receptor on the binding of VEGF to KDR on the surface of human microvascular endothelial

cells. Sequences of the ribozymes used are shown in Table IV; the length of stem II region is 3 bp. The hammerhead ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions (see Figure 5 11); U4 and U7 positions contain 2'-NH₂ modifications, the remaining nucleotide positions contain 2'-O-methyl substitutions; four nucleotides at the 5' terminus contains phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose. The Control 1-10 and Control 11-20 represent the treatment of cells with LipofectAMINE® alone without any ribozymes. Irrel. RZ, is a control experiment wherein the cells are treated with a non-KDR-targeted ribozyme complexed with Lipofectamine®. 200 nM ribozyme (3:1 15 charge ratio with LipofectAMINE®) was used. In addition to the KDR-targeted ribozymes, the effect on VEGF binding of a ribozyme targeted to an irrelevant mRNA (irrel. RZ) is also shown. Because the affinity of KDR for VEGF is about 10-fold lower than the affinity of flt-1 for VEGF, 20 a higher concentration of VEGF was used in the binding assay.

Figure 9 shows the specificity of hammerhead ribozymes targeted against flt-1 receptor. Inhibition of the binding of VEGF, urokinase plasminogen activator (UPA) and 25 fibroblast growth factor (FGF) to their corresponding receptors as a function of anti-FLT ribozymes is shown. The sequence and description of the ribozymes used are as described under Figure 7 above. The average of triplicate samples is given; percent inhibition as calculated below.

30 Figure 10 shows the inhibition of the proliferation of Human aortic endothelial cells (HAEC) mediated by phosphorothioate antisense oligodeoxynucleotides targeted against human KDR receptor RNA. Cell proliferation (O.D. 490) as a function of antisense oligodeoxynucleotide 35 concentration is shown. KDR 21AS represents a 21 nt phosphorothioate antisense oligodeoxynucleotide targeted against KDR RNA. KDR 21 Scram represents a 21 nt

phosphorothioate oligodeoxynucleotide having a scrambled sequence. LF represents the lipid carrier Lipofectin.

Figure 11 shows in vitro cleavage of *flt-1* RNA by hammerhead ribozymes. A) diagrammatic representation of
5 hammerhead ribozymes targeted against *flt-1* RNA. The hammerhead (HH) ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH₂ modifications, the remaining nucleotide positions contain
10 2'-O-methyl substitutions; four nucleotides at the 5' terminus contains phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (designated as 3'-iH). 1358 HH-A and 4229 HH-A contain 3 base-paired stem II
15 region. 1358 HH-B and 4229 HH-B contain 4 base-paired stem II region. B) and C) shows in vitro cleavage kinetics of HH ribozymes targeted against sites 1358 and 4229 within the *flt-1* RNA.

Figure 12 shows inhibition of human microvascular
20 endothelial cell proliferation mediated by anti-*flt-1* hammerhead ribozymes. A) Diagrammatic representation of hammerhead (HH) ribozymes targeted against sites 1358 and 4229 within the the *flt-1* RNA. B) Graphical representation of the inhibition of cell proliferation mediated by
25 1358HH and 4229HH ribozymes.

Figure 13 shows inhibition of human microvascular endothelial cell proliferation mediated by anti-KDR hammerhead ribozymes. The figure is a graphical representation of the inhibition of cell proliferation mediated by
30 hammerhead ribozymes targeted against sites 527, 730, 3702 and 3950 within the KDR RNA. Irrelevant HH RZ is a hammerhead ribozyme targeted to an irrelevant target. All of these ribozymes, including the Irrelevant HH RZ, were chemically modified such that the ribozyme consists of
35 ribose residues at five positions; U4 and U7 positions contain 2'-NH₂ modifications, the remaining nucleotide positions contain 2'-O-methyl substitutions; four

nucleotides at the 5' termini contain phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (3'-iH).

5 Figure 14 shows in vitro cleavage of KDR RNA by hammerhead ribozymes. The hammerhead (HH) ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH₂ modifications, the remaining nucleotide
10 positions contain 2'-O-methyl substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (designated as 3'-iH). 726 HH and 527 HH contain 4 base-paired stem II region. Percent
15 in vitro cleavage kinetics as a function of time of HH ribozymes targeted against sites 527 and 726 within the KDR RNA is shown.

Figure 15 shows in vitro cleavage of KDR RNA by hammerhead ribozymes. The hammerhead (HH) ribozymes were chemically modified such that the ribozyme consists of
20 ribose residues at five positions; U4 and U7 positions contain 2'-NH₂ modifications, the remaining nucleotide positions contain 2'-O-methyl substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (designated as 3'-iH). 3702
25 HH and 3950 HH contain 4 base-paired stem II region. Percent in vitro cleavage kinetics as a function of time of HH ribozymes targeted against sites 3702 and 3950 within the KDR RNA is shown.

Figure 16 shows in vitro cleavage of RNA by hammer-
30 head ribozymes that are targeted to sites that are conserved between flt-1 and KDR RNA. The hammerhead (HH) ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH₂ modifications, the remaining
35 nucleotide positions contain 2'-O-methyl substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (designated as 3'-iH).

FLT/KDR-I HH ribozyme was synthesized with either a 4 base-paired or a 3 base-paired stem II region. FLT/KDR-I HH can cleave site 3388 within *flt-1* RNA and site 3151 within KDR RNA. Percent in vitro cleavage kinetics as a function of time of HH ribozymes targeted against sites 3702 and 3950 within the KDR RNA is shown.

Figure 17 shows inhibition of human microvascular endothelial cell proliferation mediated by anti-KDR and anti-*flt-1* hammerhead ribozymes. The figure is a graphical representation of the inhibition of cell proliferation mediated by hammerhead ribozymes targeted against sites KDR sites-527, 726 or 3950 or *flt-1* site 4229. The figure also shows enhanced inhibition of cell proliferation by a combination of *flt-1* and KDR hammerhead ribozymes. 4229+527, indicates the treatment of cells with both the *flt* 4229 and the KDR 527 ribozymes. 4229+726, indicates the treatment of cells with both the *flt* 4229 and the KDR 726 ribozymes. 4229+3950, indicates the treatment of cells with both the *flt* 4229 and the KDR 3950 ribozymes. VEGF -, indicates the basal level of cell proliferation in the absence of VEGF. A, indicates catalytically active ribozyme; I, indicates catalytically inactive ribozyme. All of these ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH₂ modifications, the remaining nucleotide positions contain 2'-O-methyl substitutions; four nucleotides at the 5' termini contain phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (3'-iH).

Figure 18 shows the inhibition of VEGF-induced angiogenesis in rat cornea mediated by anti-*flt-1* hammerhead ribozyme. All of these ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 position contains 2'-C-allyl modifications, the remaining nucleotide positions contain 2'-O-methyl substitutions; four nucleotides at the 5' termini contain

phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (3'-iH). A decrease in the Surface Area corresponds to a reduction in angiogenesis. VEGF alone, corresponds to treatment of the cornea with VEGF and no ribozymes. Vehicle alone, corresponds to the treatment of the cornea with the carrier alone and no VEGF. This control gives a basal level of Surface Area. Active 4229 HH, corresponds to the treatment of cornea with the flt-1 4229 HH ribozyme in the absence of any VEGF. This control also gives a basal level of Surface Area. Active 4229 HH + VEGF, corresponds to the co-treatment of cornea with the flt-1 4229 HH ribozyme and VEGF. Inactive 4229 HH + VEGF, corresponds to the co-treatment of cornea with a catalytically inactive version of 4229 HH ribozyme and VEGF.

Ribozymes

Ribozymes of this invention block to some extent VEGF-R (specifically flt-1 and flk-1/KDR) production and can be used to treat disease or diagnose such disease. Ribozymes will be delivered to cells in culture, to cells or tissues in animal models of angiogenesis and/or RA and to human cells or tissues ex vivo or in vivo. Ribozyme cleavage of VEGF-R RNAs (specifically RNAs that encode flt-1 and flk-1/KDR) in these systems may alleviate disease symptoms.

Target sites

Targets for useful ribozymes can be determined as disclosed in Draper et al., International PCT Publication No. WO 95/13380, and hereby incorporated by reference herein in totality. Other examples include the following PCT applications which concern inactivation of expression of disease-related genes: WO 95/23225, WO 95/13380, WO 94/02595, incorporated by reference herein. Rather than repeat the guidance provided in those documents here, below are provided specific examples of such methods, not

limiting to those in the art. Ribozymes to such targets are designed as described in those applications and synthesized to be tested *in vitro* and *in vivo*, as also described.

5 The sequence of human and mouse *flt-1*, *KDR* and/or *flk-1* mRNAs were screened for optimal ribozyme target sites using a computer folding algorithm. Hammerhead or hairpin ribozyme cleavage sites were identified. These sites are shown in Tables II to IX (all sequences are 5' to 3' in the tables; X can be any base-paired sequence, the actual sequence is not relevant here). The nucleotide base position is noted in the Tables as that site to be cleaved by the designated type of ribozyme. While mouse and human sequences can be screened and ribozymes there-
10 after designed, the human targeted sequences are of most utility. However, as discussed in Stinchcomb et al., "Method and Composition for Treatment of Restenosis and Cancer Using Ribozymes," filed May 18, 1994, U.S.S.N. 08/245,466, mouse targeted ribozymes may be useful to test
15 efficacy of action of the ribozyme prior to testing in humans. The nucleotide base position is noted in the Tables as that site to be cleaved by the designated type of ribozyme.

Hammerhead or hairpin ribozymes were designed that
25 could bind and cleave target RNA in a sequence-specific manner. The ribozymes were individually analyzed by computer folding (Jaeger et al., 1989 *Proc. Natl. Acad. Sci. USA*, 86, 7706) to assess whether the ribozyme sequences fold into the appropriate secondary structure.
30 Those ribozymes with unfavorable intramolecular interactions between the binding arms and the catalytic core were eliminated from consideration. Varying binding arm lengths can be chosen to optimize activity.

Referring to Figure 6, mRNA is screened for access-
35 ible cleavage sites by the method described generally in Draper et al., PCT WO93/23569, hereby incorporated by reference herein. Briefly, DNA oligonucleotides

complementary to potential hammerhead or hairpin ribozyme cleavage sites were synthesized. A polymerase chain reaction is used to generate substrates for T7 RNA polymerase transcription from human and mouse flt-1, KDR and/or flk-1 cDNA clones. Labeled RNA transcripts are synthesized in vitro from the templates. The oligonucleotides and the labeled transcripts were annealed, RNaseH was added and the mixtures were incubated for the designated times at 37°C. Reactions are stopped and RNA separated on sequencing polyacrylamide gels. The percentage of the substrate cleaved is determined by autoradiographic quantitation using a PhosphorImaging system. From these data, hammerhead or hairpin ribozyme sites are chosen as the most accessible.

Ribozymes of the hammerhead or hairpin motif were designed to anneal to various sites in the mRNA message. The binding arms are complementary to the target site sequences described above. The ribozymes were chemically synthesized. The method of synthesis used follows the procedure for normal RNA synthesis as described in Usman et al., 1987 *J. Am. Chem. Soc.*, 109, 7845; Scaringe et al., 1990 *Nucleic Acids Res.*, 18, 5433; and Wincott et al., 1995 *Nucleic Acids Res.* 23, 2677-2684 and makes use of common nucleic acid protecting and coupling groups, such as dimethoxytrityl at the 5'-end, and phosphoramidites at the 3'-end. Small scale synthesis were conducted on a 394 Applied Biosystems, Inc. synthesizer using a modified 2.5 μ mol scale protocol with a 5 min coupling step for alkylsilyl protected nucleotides and 2.5 min coupling step for 2'-O-methylated nucleotides. Table XI outlines the amounts, and the contact times, of the reagents used in the synthesis cycle. A 6.5-fold excess (163 μ L of 0.1 M = 16.3 μ mol) of phosphoramidite and a 24-fold excess of S-ethyl tetrazole (238 μ L of 0.25 M = 59.5 μ mol) relative to polymer-bound 5'-hydroxyl was used in each coupling cycle. Average coupling yields on the 394 Applied Biosystems, Inc. synthesizer, determined by

colorimetric quantitation of the trityl fractions, were 97.5-99%. Other oligonucleotide synthesis reagents for the 394 Applied Biosystems, Inc. synthesizer: detritylation solution was 2% TCA in methylene chloride (ABI); capping
5 was performed with 16% N-methyl imidazole in THF (ABI) and 10% acetic anhydride/10% 2,6-lutidine in THF (ABI); oxidation solution was 16.9 mM I₂, 49 mM pyridine, 9% water in THF (Millipore). B & J Synthesis Grade acetonitrile was used directly from the reagent bottle. S-Ethyl tetra-
10 zole solution (0.25 M in acetonitrile) was made up from the solid obtained from American International Chemical, Inc.

Deprotection of the RNA was performed as follows. The polymer-bound oligoribonucleotide, trityl-off, was transferred from the synthesis column to a 4mL glass screw top
15 vial and suspended in a solution of methylamine (MA) at 65 °C for 10 min. After cooling to -20 °C, the supernatant was removed from the polymer support. The support was washed three times with 1.0 mL of EtOH:MeCN:H₂O/3:1:1,
20 vortexed and the supernatant was then added to the first supernatant. The combined supernatants, containing the oligoribonucleotide, were dried to a white powder.

The base-deprotected oligoribonucleotide was resuspended in anhydrous TEA•HF/NMP solution (250 µL of a
25 solution of 1.5mL N-methylpyrrolidinone, 750 µL TEA and 1.0 mL TEA•3HF to provide a 1.4M HF concentration) and heated to 65°C for 1.5 h. The resulting, fully deprotected, oligomer was quenched with 50 mM TEAB (9 mL) prior to anion exchange desalting.

30 For anion exchange desalting of the deprotected oligomer, the TEAB solution was loaded onto a Qiagen 500® anion exchange cartridge (Qiagen Inc.) that was prewashed with 50 mM TEAB (10 mL). After washing the loaded cartridge with 50 mM TEAB (10 mL), the RNA was eluted with
35 2 M TEAB (10 mL) and dried down to a white powder.

Inactive hammerhead ribozymes were synthesized by substituting a U for G₅ and a U for A₁, (numbering from

Hertel, K. J., et al., 1992, Nucleic Acids Res., 20, 3252).

The average stepwise coupling yields were >98% (Wincott et al., 1995 Nucleic Acids Res. 23, 2677-2684).

5 Hairpin ribozymes are synthesized in two parts and annealed to reconstruct the active ribozyme (Chowrira and Burke, 1992 Nucleic Acids Res., 20, 2835-2840). Ribozymes are also synthesized from DNA templates using bacteriophage T7 RNA polymerase (Milligan and Uhlenbeck, 1989, 10 Methods Enzymol. 180, 51).

All ribozymes are modified extensively to enhance stability by modification with nuclease resistant groups, for example, 2'-amino, 2'-C-allyl, 2'-fluoro, 2'-O-methyl, 2'-H (for a review see Usman and Cedergren, 1992 TIBS 17, 15 34; Usman et al., 1994 Nucleic Acids Symp. Ser. 31, 163). Ribozymes are purified by gel electrophoresis using general methods or are purified by high pressure liquid chromatography (HPLC; See Usman et al., PCT Publication No. WO95/23225, the totality of which is hereby incorporated herein by reference) and are resuspended in water. 20

The sequences of the ribozymes that are chemically synthesized, useful in this study, are shown in Tables II to IX. Those in the art will recognize that these sequences are representative only of many more such 25 sequences where the enzymatic portion of the ribozyme (all but the binding arms) is altered to affect activity. Stem-loop IV sequence of hairpin ribozymes listed in for example Table III (5'-CACGUUGUG-3') can be altered (substitution, deletion, and/or insertion) to contain any 30 sequence, provided a minimum of two base-paired stem structure can form. The sequences listed in Tables II to IX may be formed of ribonucleotides or other nucleotides or non-nucleotides. Such ribozymes are equivalent to the ribozymes described specifically in the Tables.

Optimizing Ribozyme Activity

Ribozyme activity can be optimized as described by Stinchcomb et al., supra. The details will not be repeated here, but include altering the length of the
5 ribozyme binding arms (stems I and III, see Figure 2c), or chemically synthesizing ribozymes with modifications that prevent their degradation by serum ribonucleases (see e.g., Eckstein et al., International Publication No. WO 92/07065; Perrault et al., 1990 *Nature* 344, 565; Pieken et al., 1991 *Science* 253, 314; Usman and Cedergren, 1992
10 *Trends in Biochem. Sci.* 17, 334; Usman et al., International Publication No. WO 93/15187; Rossi et al., International Publication No. WO 91/03162; Beigelman et al., 1995 *J. Biol Chem.* in press; as well as Sproat, US
15 Patent No. 5,334,711 which describe various chemical modifications that can be made to the sugar moieties of enzymatic RNA molecules). Modifications which enhance their efficacy in cells, and removal of stem II bases to shorten RNA synthesis times and reduce chemical require-
20 ments are desired. (All these publications are hereby incorporated by reference herein).

Sullivan, et al., supra, describes the general methods for delivery of enzymatic RNA molecules. Ribozymes may be administered to cells by a variety of
25 methods known to those familiar to the art, including, but not restricted to, encapsulation in liposomes, by iontophoresis, or by incorporation into other vehicles, such as hydrogels, cyclodextrins, biodegradable nanocapsules, and bioadhesive microspheres. For some indications, ribozymes
30 may be directly delivered ex vivo to cells or tissues with or without the aforementioned vehicles. Alternatively, the RNA/vehicle combination is locally delivered by direct injection or by use of a catheter, infusion pump or stent. Other routes of delivery include, but are not limited to,
35 intravascular, intramuscular, subcutaneous or joint injection, aerosol inhalation, oral (tablet or pill form), topical, systemic, ocular, intraperitoneal and/or intra-

thecal delivery. More detailed descriptions of ribozyme delivery and administration are provided in Sullivan et al., supra and Draper et al., supra which have been incorporated by reference herein.

5 Another means of accumulating high concentrations of a ribozyme(s) within cells is to incorporate the ribozyme-encoding sequences into a DNA or RNA expression vector. Transcription of the ribozyme sequences are driven from a promoter for eukaryotic RNA polymerase I (pol I), RNA
10 polymerase II (pol II), or RNA polymerase III (pol III). Transcripts from pol II or pol III promoters will be expressed at high levels in all cells; the levels of a given pol II promoter in a given cell type will depend on the nature of the gene regulatory sequences (enhancers,
15 silencers, etc.) present nearby. Prokaryotic RNA polymerase promoters are also used, providing that the prokaryotic RNA polymerase enzyme is expressed in the appropriate cells (Elroy-Stein and Moss, 1990 *Proc. Natl. Acad. Sci. U S A*, 87, 6743-7; Gao and Huang 1993 *Nucleic Acids Res.*,
20 21, 2867-72; Lieber et al., 1993 *Methods Enzymol.*, 217, 47-66; Zhou et al., 1990 *Mol. Cell. Biol.*, 10, 4529-37; Thompson et al., 1995 *supra*). Several investigators have demonstrated that ribozymes expressed from such promoters can function in mammalian cells (e.g. Kashani-Sabet et al., 1992 *Antisense Res. Dev.*, 2, 3-15; Ojwang et al., 1992 *Proc. Natl. Acad. Sci. U S A*, 89, 10802-6; Chen et al., 1992 *Nucleic Acids Res.*, 20, 4581-9; Yu et al., 1993 *Proc. Natl. Acad. Sci. U S A*, 90, 6340-4; L'Huillier et al., 1992 *EMBO J.* 11, 4411-8; Lisiewicz et al., 1993
30 *Proc. Natl. Acad. Sci. U. S. A.*, 90, 8000-4; Thompson et al., 1995 *Nucleic Acids Res.* 23, 2259). The above ribozyme transcription units can be incorporated into a variety of vectors for introduction into mammalian cells, including but not restricted to, plasmid DNA vectors,
35 viral DNA vectors (such as adenovirus or adeno-associated virus vectors), or viral RNA vectors (such as retroviral or alphavirus vectors).

In a preferred embodiment of the invention, a transcription unit expressing a ribozyme that cleaves RNAs that encode flt-1, KDR and/or flk-1 are inserted into a plasmid DNA vector or an adenovirus or adeno-associated virus DNA viral vector or a retroviral RNA vector. Viral
5 vectors have been used to transfer genes and lead to either transient or long term gene expression (Zabner et al., 1993 Cell 75, 207; Carter, 1992 Curr. Opi. Biotech. 3, 533). The adenovirus, AAV or retroviral vector is delivered as recombinant viral particles. The DNA may be
10 delivered alone or complexed with vehicles (as described for RNA above). The recombinant adenovirus or AAV or retroviral particles are locally administered to the site of treatment, e.g., through incubation or inhalation in
15 vivo or by direct application to cells or tissues ex vivo. Retroviral vectors have also been used to express ribozymes in mammalian cells (Ojwang et al., 1992 *supra*; Thompson et al., 1995 *supra*).

flt-1, KDR and/or flk-1 are attractive nucleic
20 acid-based therapeutic targets by several criteria. The interaction between VEGF and VEGF-R is well-established. Efficacy can be tested in well-defined and predictive animal models. Finally, the disease conditions are serious and current therapies are inadequate. Whereas
25 protein-based therapies would inhibit VEGF activity nucleic acid-based therapy provides a direct and elegant approach to directly modulate flt-1, KDR and/or flk-1 expression.

Because flt-1 and KDR mRNAs are highly homologous in
30 certain regions, some ribozyme target sites are also homologous (see Table X). In this case, a single ribozyme will target both flt-1 and KDR mRNAs. At partially homologous sites, a single ribozyme can sometimes be designed to accomodate a site on both mRNAs by including
35 G/U basepairing. For example, if there is a G present in a ribozyme target site in KDR mRNA at the same position there is an A in the flt-1 ribozyme target site, the

ribozyme can be synthesized with a U at the complementary position and it will bind both to sites. The advantage of one ribozyme that targets both VEGF-R mRNAs is clear, especially in cases where both VEGF receptors may contribute to the progression of angiogenesis in the disease state.

"Angiogenesis" refers to formation of new blood vessels which is an essential process in reproduction, development and wound repair. "Tumor angiogenesis" refers to the induction of the growth of blood vessels from surrounding tissue into a solid tumor. Tumor growth and tumor metastasis are dependent on angiogenesis (for a review see Folkman, 1985 *supra*; Folkman 1990 *J. Natl. Cancer Inst.*, 82, 4; Folkman and Shing, 1992 *J. Biol. Chem.* 267, 10931).

Angiogenesis plays an important role in other diseases such as arthritis wherein new blood vessels have been shown to invade the joints and degrade cartilage (Folkman and Shing, *supra*).

"Retinopathy" refers to inflammation of the retina and/or degenerative condition of the retina which may lead to occlusion of the retina and eventual blindness. In "diabetic retinopathy" angiogenesis causes the capillaries in the retina to invade the vitreous resulting in bleeding and blindness which is also seen in neonatal retinopathy (for a review see Folkman, 1985 *supra*; Folkman 1990 *supra*; Folkman and Shing, 1992 *supra*).

Example 1: flt-1, KDR and/or flk-1 ribozymes

By engineering ribozyme motifs applicant has designed several ribozymes directed against flt-1, KDR and/or flk-1 encoded mRNA sequences. These ribozymes were synthesized with modifications that improve their nuclease resistance (Beigelman et al., 1995 *J Biol. Chem.* 270, 25702) and enhance their activity in cells. The ability of ribozymes to cleave target sequences *in vitro* was evaluated essentially as described in Thompson et al., PCT Publication

No. WO 93/23057; Draper et al., PCT Publication No. WO 95/04818.

Example 2: Effect of ribozymes on the binding of VEGF to flt-1, KDR and/or flk-1 receptors

5 Several common human cell lines are available that express endogenous flt-1, KDR and/or flk-1. flt-1, KDR and/or flk-1 can be detected easily with monoclonal antibodies. Use of appropriate fluorescent reagents and fluorescence-activated cell-sorting (FACS) will permit
10 direct quantitation of surface flt-1, KDR and/or flk-1 on a cell-by-cell basis. Active ribozymes are expected to directly reduce flt-1, KDR and/or flk-1 expression and thereby reduce VEGF binding to the cells. In this example, human umbilical cord microvascular endothelial
15 cells were used.

Cell Preparation:

Plates are coated with 1.5% gelatin and allowed to stand for one hour. Cells (e.g., microvascular endothelial cells derived from human umbilical cord vein) are
20 plated at 20,000 cells/well (24 well plate) in 200 ml growth media and incubated overnight (~ 1 doubling) to yield ~40,000 cells (75-80% confluent).

Ribozyme treatment:

Media is removed from cells and the cells are washed
25 two times with 300 ml 1X PBS: Ca^{2+} : Mg^{2+} mixture. A complex of 200-500 nM ribozyme and LipofectAMINE® (3:1 lipid: phosphate ratio) in 200 ml OptiMEM® (5% FBS) was added to the cells. The cells are incubated for 6 hr (equivalent to 2-3 VEGF-R turnovers).

30 ^{125}I VEGF binding assay:

The assay is carried out on ice to inhibit internalization of VEGF during the experiment. The media containing the ribozyme is removed from the cells and the cells

are washed twice with with 300 ml 1X PBS: Ca^{2+} : Mg^{2+} mixture containing 1% BSA. Appropriate ^{125}I VEGF solution (100,000 cpm/well, +/- 10 X cold 1X PBS, 1% BSA) was applied to the cells. The cells are incubated on ice for 1 h. ^{125}I VEGF-containing solution is removed and the cells are washed three times with with 300 ml 1X PBS: Ca^{2+} : Mg^{2+} mixture containing 1% BSA. To each well 300 ml of 100 mM Tris-HCl, pH 8.0, 0.5% Triton X-100 was added and the the mixture was incubated for 2 min. The ^{125}I VEGF-binding was quantitated using standard scintillation counting techniques. Percent inhibition was calculated as follows:

Percent Inhibition =

$$\frac{\text{cpm } ^{125}\text{I VEGF bound by the ribozyme-treated samples}}{\text{cpm } ^{125}\text{I VEGF bound by the Control sample}} \times 100$$

Example 3: Effect of hammerhead ribozymes targeted against flt-1 receptor on the binding of VEGF

Hammerhead ribozymes targeted to twenty sites within flt-1 RNA were synthesized as described above. Sequence of the ribozymes used are shown in Table II; the length of stem II region is 3 bp. The hammerhead ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH₂ modifications, the remaining nucleotide positions contain 2'-O-methyl substitutions; four nucleotides at the 5' terminus contains phosphorothioate substitutions. Additionally, 3' end of the ribozyme contains a 3'-3' linked inverted abasic ribose.

Referring to Figure 7, the effect of hammerhead ribozymes targeted against flt-1 receptor on the binding of VEGF to flt-1 on the surface of human microvascular endothelial cells is shown. The majority of the ribozymes tested were able to inhibit the expression of flt-1 and thereby were able to inhibit the binding of VEGF.

In order to determine the specificity of ribozymes targeted against flt-1 RNA, the effect of five anti-flt-1 ribozymes on the binding of VEGF, UPA (urokinase plasmino-

gen activator) and FGF (fibroblast growth factor) to their corresponding receptors were assayed. As shown in Figure 9, there was significant inhibition of VEGF binding to its receptors on cells treated with anti-flt-1 ribozymes.

5 There was no specific inhibition of the binding of UPA and FGF to their corresponding receptors. These data strongly suggest that anti-flt-1 ribozymes specifically cleave flt-1 RNA and not RNAs encoding the receptors for UPA and FGF, resulting in the inhibition of flt-1 receptor expres-

10 sion on the surface of the cells. Thus the ribozymes are responsible for the inhibition of VEGF binding but not the binding of UPA and FGF.

Example 4: Effect of hammerhead ribozymes targeted against KDR receptor on the binding of VEGF

15 Hammerhead ribozymes targeted to twenty one sites within KDR RNA were synthesized as described above. Sequence of the ribozymes used are shown in Table IV; the length of stem II region is 3 bp. The hammerhead ribozymes were chemically modified such that the ribozyme

20 consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH₂ modifications, the remaining nucleotide positions contain 2'-O-methyl substitutions; four nucleotides at the 5' terminus contains phosphorothioate substitutions. Additionally, the 3' end of the

25 ribozyme contains a 3'-3' linked inverted abasic deoxyribose.

Referring to Figure 8, the effect of hammerhead ribozymes targeted against KDR receptor on the binding of VEGF to KDR on the surface of human microvascular endothelial cells is shown. A majority of the ribozymes

30 tested were able to inhibit the expression of KDR and thereby were able to inhibit the binding of VEGF. As a control, the cells were treated with a ribozyme that is not targeted towards KDR RNA (irrel. RZ); there was no

35 specific inhibition of VEGF binding. The results from this control experiment strongly suggest that the inhibi-

tion of VEGF binding observed with anti-KDR ribozymes is a ribozyme-mediated inhibition.

Example 5: Effect of ribozymes targeted against VEGF receptors on cell proliferation

5 Cell Preparation:

24-well plates are coated with 1.5% gelatin (porcine skin 300 bloom). After 1 hr, excess gelatin is washed off of the plate. Microvascular endothelial cells are plated at 5,000 cells/well (24 well plate) in 200 ml growth
10 media. The cells are allowed to grow for ~ 18 hr (~ 1 doubling) to yield ~10,000 cells (25-30% confluent).

Ribozyme treatment:

Media is removed from the cells, and the cells are washed two times with 300 ml 1X PBS: Ca^{2+} : Mg^{2+} mixture.

15 For anti-flt-1 HH ribozyme experiment (Figure 12) a complex of 500 nM ribozyme; 15 mM LFA (3:1 lipid:phosphate ratio) in 200 ml OptiMEM (5% FCS) media was added to the cells. Incubation of cells is carried out for 6 hr (equivalent to 2-3 VEGF receptor turnovers).

20 For anti-KDR HH ribozyme experiment (Figure 13) a complex of 200 nM ribozyme; 5.25 mM LFA (3:1 lipid:phosphate ratio) in 200 ml OptiMEM (5% FCS) media was added to the cells. Incubation of cells is carried out for 3 hr.

25 Proliferation:

After three or six hours, the media is removed from the cells and the cells are washed with 300 ml 1X PBS: Ca^{2+} : Mg^{2+} mixture. Maintenance media (contains dialyzed 10% FBS) +/- VEGF or basic FGF at 10 ng/ml is added to the
30 cells. The cells are incubated for 48 or 72 h. The cells are trypsinized and counted (Coulter counter). Trypan blue is added on one well of each treatment as control.

As shown in Figure 12B, VEGF and basic FGF can stimulate human microvascular endothelial cell proliferation. However, treatment of cells with 1358 HH or 4229 HH ribozymes, targeted against flt-1 mRNA, results in a significant decrease in the ability of VEGF to stimulate endothelial cell proliferation. These ribozymes do not inhibit the FGF-mediated stimulation of endothelial cell proliferation.

Human microvascular endothelial cells were also treated with hammerhead ribozymes targeted against sites 527, 730, 3702 or 3950 within the KDR mRNA. As shown in Figure 13, all four ribozymes caused significant inhibition of VEGF-mediated induction of cell proliferation. No significant inhibition of cell proliferation was observed when the cells were treated with a hammerhead ribozyme targeted to an irrelevant RNA. Additionally, none of the ribozymes inhibited FGF-mediated stimulation of cell proliferation.

These results strongly suggest that hammerhead ribozymes targeted against either flt-1 or KDR mRNA can specifically inhibit VEGF-mediated induction of endothelial cell proliferation.

Example 6: Effect of antisense oligonucleotides targeted against VEGF receptors on cell proliferation (colorimetric assay)

Following are some of the reagents used in the proliferation assay:

Cells: Human aortic endothelial cells (HAEC) from Clonetics®. Cells at early passage are preferably used.

Uptake Medium: EBM (from Clonetics®); 1% L-Glutamine; 20 mM Hepes; No serum; No antibiotics.

Growth Medium: EGM (from Clonetics®); FBS to 20%; 1% L-Glutamine; 20 mM Hepes.

Cell Plating: 96-well tissue culture plates are coated with 0.2% gelatin (50 ml/well). The gelatin is incubated in the wells at room temperature for 15-30

minutes. The gelatin is removed by aspiration and the wells are washed with PBS:Ca²⁺: Mg²⁺ mixture. PBS mixture is left in the wells until cells are ready to be added. HAEC cells were detached by trypsin treatment and resuspended at 1.25 x 10⁴/ml in growth medium. PBS is removed from plates and 200 µl of cells (i.e. 2.5 x 10³ cells/well) are added to each well. The cells are allowed to grow for 48 hours before the proliferation assay.

Assay: Growth medium is removed from the wells. The cells are washed twice with PBS:Ca²⁺: Mg²⁺ mixture without antibiotics. A formulation of lipid/antisense oligonucleotide (antisense oligonucleotide is used here as a non-limiting example) complex is added to each well (100 µl/well) in uptake medium. The cells are incubated for 2-3 hours at 37°C in CO₂ incubator. After uptake, 100 µl/well of growth medium is added (gives final FBS concentration of 10%). After approximately 72 hours, 40 µl MTS[®] stock solution (made as described by manufacturer) was added to each well and incubated at 37°C for 1-3 hours, depending on the color development. (For this assay, 2 hours was sufficient). The intensity of color formation was determined on a plate reader at 490 nm.

Phosphorothioate-substituted antisense oligodeoxynucleotides were custom synthesized by The Midland Certified Reagent Company[®], Midland, Texas. Following non-limiting antisense oligodeoxynucleotides targeted against KDR RNA were used in the proliferation assay:

KDR 21 AS: 5'-GCA GCA CCT TGC TCT CCA TCC-3'

SCRAMBLED CONTROL: 5'-CTG CCA ACT TCC CAT GCC TGC-3'

As shown in Figure 10, proliferation of HAEC cells are specifically inhibited by increasing concentrations of the phosphorothioate anti-KDR-antisense oligodeoxynucleotide. The scrambled antisense oligonucleotide is not expected to bind the KDR RNA and therefore is not expected to inhibit KDR expression. As expected, there is no detectable inhibition of proliferation of HAEC cells

treated with a phosphorothioate antisense oligonucleotide with scrambled sequence.

Example 7: In vitro cleavage of *flt-1* RNA by hammerhead ribozymes

5 Referring to Figure 11A, hammerhead ribozymes (HH) targeted against sites 1358 and 4229 within the *flt-1* RNA were synthesized as described above.

RNA cleavage assay in vitro:

Substrate RNA was 5' end-labeled using [γ - 32 P] ATP and
10 T4 polynucleotide kinase (US Biochemicals). Cleavage reactions were carried out under ribozyme "excess" conditions. Trace amount (≤ 1 nM) of 5' end-labeled substrate and 40 nM unlabeled ribozyme were denatured and renatured separately by heating to 90°C for 2 min and snap-cooling
15 on ice for 10-15 min. The ribozyme and substrate were incubated, separately, at 37°C for 10 min in a buffer containing 50 mM Tris-HCl and 10 mM MgCl₂. The reaction was initiated by mixing the ribozyme and substrate solutions and incubating at 37°C. Aliquots of 5 ml are taken
20 at regular intervals of time and the reaction is quenched by mixing with equal volume of 2X formamide stop mix. The samples are resolved on 20 % denaturing polyacrylamide gels. The results were quantified and percentage of target RNA cleaved is plotted as a function of time.

25 Referring to Figure 11B and 11C, hammerhead ribozymes targeted against sites 1358 and 4229 within the *flt-1* RNA are capable of cleaving target RNA efficiently in vitro.

Example 8: In vitro cleavage of KDR RNA by hammerhead ribozymes

30 In this non-limiting example, hammerhead ribozymes targeted against sites 726, 527, 3702 and 3950 within KDR RNA were synthesized as described above. RNA cleavage reactions were carried out in vitro essentially as described under Example 7.

Referring to Figures 14 and 15, all four ribozymes were able to cleave their cognate target RNA efficiently in a sequence-specific manner.

5 Example 9: In vitro cleavage of RNA by hammerhead ribozymes targeted against cleavage sites that are homologous between KDR and flt-1 mRNA

Because flt-1 and KDR mRNAs are highly homologous in certain regions, some ribozyme target sites are also homologous (see Table X). In this case, a single ribozyme will target both flt-1 and KDR mRNAs. Hammerhead ribozyme (FLT/KDR-I) targeted against one of the homologous sites between flt-1 and KDR (flt-1 site 3388 and KDR site 3151) was synthesized as described above. Ribozymes with either a 3 bp stem II or a 4 bp stem II were synthesized. RNA cleavage reactions were carried out in vitro essentially as described under Example 7.

Referring to Figure 16, FLT/KDR-I ribozyme with either a 3 or a 4 bp stem II was able to cleave its target RNA efficiently in vitro.

20 Example 10: Effect of multiple ribozymes targeted against both flt-1 and KDR RNA on cell proliferation

Since both flt-1 and KDR receptors of VEGF are involved in angiogenesis, the inhibition of the expression of both of these genes may be an effective approach to inhibit angiogenesis.

Human microvascular endothelial cells were treated with hammerhead ribozymes targeted against sites flt-1 4229 alone, KDR 527 alone, KDR 726 alone, KDR 3950 alone, flt-1 4229 + KDR 527, flt-1 4229 + KDR 726 or flt-1 4229 + KDR 3950. As shown in Figure 17, all the combinations of active ribozymes (A) caused significant inhibition of VEGF-mediated induction of cell proliferation. No significant inhibition of cell proliferation was observed when the cells were treated with a catalytically inactive (I) hammerhead ribozymes. Additionally, cells treated

with ribozymes targeted against both *flt-1* and *KDR* RNAs-
flt-1 4229 + *KDR* 527; *flt-1* 4229 + *KDR* 726; *flt-1* 4229 +
KDR 3950, were able to cause a greater inhibition of
VEGF-mediated induction of cell proliferation when
5 compared with individual ribozymes targeted against either
flt-1 or *KDR* RNA (see *flt-1* 4229 alone; *KDR* 527 alone; *KDR*
726 alone; *KDR* 3950 alone). This strongly suggests that
treatment of cells with multiple ribozymes may be a more
effective means of inhibition of gene expression.

10 Animal Models

There are several animal models in which the
anti-angiogenesis effect of nucleic acids of the present
invention, such as ribozymes, directed against VEGF-R
mRNAs can be tested. Typically a corneal model has been
15 used to study angiogenesis in rat and rabbit since
recruitment of vessels can easily be followed in this
normally avascular tissue (Pandey et al., 1995 *Science*
268: 567-569). In these models, a small Teflon or Hydron
disk pretreated with an angiogenesis factor (e.g. bFGF or
20 VEGF) is inserted into a pocket surgically created in the
cornea. Angiogenesis is monitored 3 to 5 days later.
Ribozymes directed against VEGF-R mRNAs would be delivered
in the disk as well, or dropwise to the eye over the time
course of the experiment. In another eye model, hypoxia
25 has been shown to cause both increased expression of VEGF
and neovascularization in the retina (Pierce et al., 1995
Proc. Natl. Acad. Sci. USA. 92: 905-909; Shweiki et al.,
1992 *J. Clin. Invest.* 91: 2235-2243).

In human glioblastomas, it has been shown that VEGF
30 is at least partially responsible for tumor angiogenesis
(Plate et al., 1992 *Nature* 359, 845). Animal models have
been developed in which glioblastoma cells are implanted
subcutaneously into nude mice and the progress of tumor
growth and angiogenesis is studied (Kim et al., 1993
35 *supra*; Millauer et al., 1994 *supra*).

Another animal model that addresses neovascularization involves Matrigel, an extract of basement membrane that becomes a solid gel when injected subcutaneously (Passaniti et al., 1992 *Lab. Invest.* 67: 519-528). When
5 the Matrigel is supplemented with angiogenesis factors such as VEGF, vessels grow into the Matrigel over a period of 3 to 5 days and angiogenesis can be assessed. Again, ribozymes directed against VEGF-R mRNAs would be delivered in the Matrigel.

10 Several animal models exist for screening of anti-angiogenic agents. These include corneal vessel formation following corneal injury (Burger et al., 1985 *Cornea* 4: 35-41; Lepri, et al., 1994 *J. Ocular Pharmacol.* 10: 273-280; Ormerod et al., 1990 *Am. J. Pathol.* 137: 1243-1252).
15 or intracorneal growth factor implant (Grant et al., 1993 *Diabetologia* 36: 282-291; Pandey et al. 1995 *supra*; Zieche et al., 1992 *Lab. Invest.* 67: 711-715), vessel growth into Matrigel matrix containing growth factors (Passaniti et al., 1992 *supra*), female reproductive organ neovasculari-
20 zation following hormonal manipulation (Shweiki et al., 1993 *Clin. Invest.* 91: 2235-2243), several models involving inhibition of tumor growth in highly vascularized solid tumors (O'Reilly et al., 1994 *Cell* 79: 315-328; Senger et al., 1993 *Cancer and Metas. Rev.* 12: 303-324;
25 Takahasi et al., 1994 *Cancer Res.* 54: 4233-4237; Kim et al., 1993 *supra*), and transient hypoxia-induced neovascularization in the mouse retina (Pierce et al., 1995 *Proc. Natl. Acad. Sci. USA.* 92: 905-909).

The cornea model, described in Pandey et al. *supra*,
30 is the most common and well characterized anti-angiogenic agent efficacy screening model. This model involves an avascular tissue into which vessels are recruited by a stimulating agent (growth factor, thermal or alkali burn, endotoxin). The corneal model would utilize the intra-
35 stromal corneal implantation of a Teflon pellet soaked in a VEGF-Hydrion solution to recruit blood vessels toward the pellet which can be quantitated using standard microscopic

and image analysis techniques. To evaluate their anti-angiogenic efficacy, ribozymes are applied topically to the eye or bound within Hydron on the Teflon pellet itself. This avascular cornea as well as the Matrigel
5 (see below) provide for low background assays. While the corneal model has been performed extensively in the rabbit, studies in the rat have also been conducted.

The mouse model (Passaniti et al., *supra*) is a non-tissue model which utilizes Matrigel, an extract of
10 basement membrane (Kleinman et al., 1986) or Millipore® filter disk, which can be impregnated with growth factors and anti-angiogenic agents in a liquid form prior to injection. Upon subcutaneous administration at body temperature, the Matrigel or Millipore® filter disk forms
15 a solid implant. VEGF embedded in the Matrigel or Millipore® filter disk would be used to recruit vessels within the matrix of the Matrigel or Millipore® filter disk which can be processed histologically for endothelial cell specific vWF (factor VIII antigen) immunohisto-
20 chemistry, Trichrome-Masson stain, or hemoglobin content. Like the cornea, the Matrigel or Millipore® filter disk are avascular; however, it is not tissue. In the Matrigel or Millipore® filter disk model, ribozymes are administered within the matrix of the Matrigel or Millipore®
25 filter disk to test their anti-angiogenic efficacy. Thus, delivery issues in this model, as with delivery of ribozymes by Hydron-coated Teflon pellets in the rat cornea model, may be less problematic due to the homogeneous presence of the ribozyme within the respective matrix.

30 These models offer a distinct advantage over several other angiogenic models listed previously. The ability to use VEGF as a pro-angiogenic stimulus in both models is highly desirable since ribozymes will target only VEGFR mRNA. In other words, the involvement of other non-
35 specific types of stimuli in the cornea and Matrigel models is not advantageous from the standpoint of understanding the pharmacologic mechanism by which the

anti-VEGFR mRNA ribozymes produce their effects. In addition, the models will allow for testing the specificity of the anti-VEGFR mRNA ribozymes by using either a- or bFGF as a pro-angiogenic factor. Vessel recruitment using FGF should not be affected in either model by anti-VEGFR mRNA ribozymes. Other models of angiogenesis including vessel formation in the female reproductive system using hormonal manipulation (Shweiki et al., 1993 *supra*); a variety of vascular solid tumor models which involve indirect correlations with angiogenesis (O'Reilly et al., 1994 *supra*; Senger et al., 1993 *supra*; Takahasi et al., 1994 *supra*; Kim et al., 1993 *supra*); and retinal neovascularization following transient hypoxia (Pierce et al., 1995 *supra*) were not selected for efficacy screening due to their non-specific nature, although there is a correlation between VEGF and angiogenesis in these models.

Other model systems to study tumor angiogenesis is reviewed by Folkman, 1985 *Adv. Cancer. Res.* 43, 175.

flt-1, KDR and/or flk-1 protein levels can be measured clinically or experimentally by FACS analysis. flt-1, KDR and/or flk-1 encoded mRNA levels will be assessed by Northern analysis, RNase-protection, primer extension analysis and/or quantitative RT-PCR. Ribozymes that block flt-1, KDR and/or flk-1 protein encoding mRNAs and therefore result in decreased levels of flt-1, KDR and/or flk-1 activity by more than 20% *in vitro* will be identified.

Ribozymes and/or genes encoding them are delivered by either free delivery, liposome delivery, cationic lipid delivery, adeno-associated virus vector delivery, adeno-virus vector delivery, retrovirus vector delivery or plasmid vector delivery in these animal model experiments (see above).

Patients can be treated by locally administering nucleic acids targeted against VEGF-R by direct injection. Routes of administration may include, but are not limited to, intravascular, intramuscular, subcutaneous, intra-

articular, aerosol inhalation, oral (tablet, capsule or pill form), topical, systemic, ocular, intraperitoneal and/or intrathecal delivery.

Example 11: Ribozyme-mediated inhibition of angiogenesis
5 in vivo

The purpose of this study was to assess the anti-angiogenic activity of hammerhead ribozymes targeted against flt-1 4229 site in the rat cornea model of VEGF induced angiogenesis (see above). These ribozymes have
10 either active or inactive catalytic core and either bind and cleave or just bind to VEGF-R mRNA of the flt-1 subtype. The active ribozymes, that are able to bind and cleave the target RNA, have been shown to inhibit (¹²⁵I-labeled) VEGF binding in cultured endothelial cells
15 and produce a dose-dependent decrease in VEGF induced endothelial cell proliferation in these cells (see Examples 3-5 above). The catalytically inactive forms of these ribozymes, wherein the ribozymes can only bind to the RNA but cannot catalyze RNA cleavage, fail to show
20 these characteristics. The ribozymes and VEGF were co-delivered using the filter disk method: Nitrocellulose filter disks (Millipore®) of 0.057 diameter were immersed in appropriate solutions and were surgically implanted in rat cornea as described by Pandey et al., supra. This
25 delivery method has been shown to deliver rhodamine-labeled free ribozyme to scleral cells and, in all likelihood cells of the pericorneal vascular plexus. Since the active ribozymes show cell culture efficacy and can be delivered to the target site using the disk method,
30 it is essential that these ribozymes be assessed for in vivo anti-angiogenic activity.

The stimulus for angiogenesis in this study was the treatment of the filter disk with 30 mM VEGF which is implanted within the cornea's stroma. This dose yields
35 reproducible neovascularization stemming from the pericorneal vascular plexus growing toward the disk in a

dose-response study 5 days following implant. Filter disks treated only with the vehicle for VEGF show no angiogenic response. The ribozymes was co-administered with VEGF on a disk in two different ribozyme concentrations. One concern with the simultaneous administration is that the ribozymes will not be able to inhibit angiogenesis since VEGF receptors can be stimulated. However, we have observed that in low VEGF doses, the neovascular response reverts to normal suggesting that the VEGF stimulus is essential for maintaining the angiogenic response. Blocking the production of VEGF receptors using simultaneous administration of anti-VEGF-R mRNA ribozymes could attenuate the normal neovascularization induced by the filter disk treated with VEGF.

15 Materials and Methods:

1. Stock hammerhead ribozyme solutions:

- a. flt-1 4229 (786 μ M)- Active
- b. flt-1 4229 (736 μ M)- Inactive

2. Experimental solutions/groups:

- | | | | |
|----|---|------------|---|
| 20 | Group 1 | Solution 1 | Control VEGF solution: 30 μ M in 82mM Tris base |
| | Group 2 | Solution 2 | flt-1 4229 (1 μ g/ μ L) in 30 μ M VEGF/82 mM Tris base |
| | Group 3 | Solution 3 | flt-1 4229 (10 μ g/ μ L) in 30 μ M VEGF/82 mM Tris base |
| 25 | Group 4 | Solution 4 | No VEGF, flt-1 4229 (10 μ g/ μ L) in 82 mM Tris base |
| | Group 5 | Solution 5 | No VEGF, No ribozyme in 82 mM Tris base |
| 30 | 10 eyes per group, 5 animals (Since they have similar molecular weights, the molar concentrations should be essentially similar). | | |

Each solution (VEGF and RIBOZYMES) were prepared as a 2X solution for 1:1 mixing for final concentrations

above, with the exception of solution 1 in which VEGF was 2X and diluted with ribozyme diluent (sterile water).

3. VEGF Solutions

The 2X VEGF solution (60 μ M) was prepared from a stock of 0.82 μ g/ μ L in 50 mM Tris base. 200 μ L of VEGF stock was concentrated by speed vac to a final volume of 60.8 μ L, for a final concentration of 2.7 μ g/ μ L or 60 μ M. Six 10 μ L aliquots was prepared for daily mixing. 2X solutions for VEGF and Ribozyme was stored at 4°C until the day of the surgery. Solutions were mixed for each day of surgery. Original 2X solutions was prepared on the day before the first day of the surgery.

4. Surgical Solutions:

Anesthesia:

stock ketamine hydrochloride 100 mg/mL
stock xylazine hydrochloride 20 mg/mL
stock acepromazine 10 mg/mL
Final anesthesia solution: 50 mg/mL ketamine, 10 mg/mL xylazine, and 0.5 mg/mL acepromazine
5% povidone iodine for ophthalmic surgical wash
2% lidocaine (sterile) for ophthalmic administration (2 drops per eye)
sterile 0.9% NaCl for ophthalmic irrigation

5. Surgical Methods:

Standard surgical procedure as described in Pandey et al., supra. Filter disks were incubated in 1 μ L of each solution for approximately 30 minutes prior to implantation.

5. Experimental Protocol:

The animal cornea were treated with the treatment groups as described above. Animals were allowed to recover for 5 days after treatment with daily observation (scoring 0 - 3). On the fifth day animals were euthanized and

digital images of each eye was obtained for quantitation using Image Pro Plus. Quantitated neovascular surface area were analyzed by ANOVA followed by two post-hoc tests including Dunnett's and Tukey-Kramer tests for significance at the 95% confidence level. Dunnett's provide information on the significance between the differences within the means of treatments vs. controls while Tukey-Kramer provide information on the significance of differences within the means of each group.

Results are graphically represented in Figure 18. As shown in the figure, flt-1 4229 active hammerhead ribozyme at both concentrations was effective at inhibiting angiogenesis while the inactive ribozyme did not show any significant reduction in angiogenesis. A statistically significant reduction in neovascular surface area was observed only with active ribozymes. This result clearly shows that the ribozymes are capable of significantly inhibiting angiogenesis *in vivo*. Specifically, the mechanism of inhibition appears to be by the binding and cleavage of target RNA by ribozymes.

Diagnostic uses

Ribozymes of this invention may be used as diagnostic tools to examine genetic drift and mutations within diseased cells or to detect the presence of flt-1, KDR and/or flk-1 RNA in a cell. The close relationship between ribozyme activity and the structure of the target RNA allows the detection of mutations in any region of the molecule which alters the base-pairing and three-dimensional structure of the target RNA. By using multiple ribozymes described in this invention, one may map nucleotide changes which are important to RNA structure and function *in vitro*, as well as in cells and tissues. Cleavage of target RNAs with ribozymes may be used to inhibit gene expression and define the role (essentially) of specified gene products in the progression of disease. In this manner, other genetic targets

may be defined as important mediators of the disease. These experiments will lead to better treatment of the disease progression by affording the possibility of combinational therapies (e.g., multiple ribozymes targeted
5 to different genes, ribozymes coupled with known small molecule inhibitors, or intermittent treatment with combinations of ribozymes and/or other chemical or biological molecules). Other *in vitro* uses of ribozymes of this invention are well known in the art, and include
10 detection of the presence of mRNAs associated with flt-1, KDR and/or flk-1 related condition. Such RNA is detected by determining the presence of a cleavage product after treatment with a ribozyme using standard methodology.

In a specific example, ribozymes which can cleave
15 only wild-type or mutant forms of the target RNA are used for the assay. The first ribozyme is used to identify wild-type RNA present in the sample and the second ribozyme will be used to identify mutant RNA in the sample. As reaction controls, synthetic substrates of both wild-
20 type and mutant RNA will be cleaved by both ribozymes to demonstrate the relative ribozyme efficiencies in the reactions and the absence of cleavage of the "non-targeted" RNA species. The cleavage products from the synthetic substrates will also serve to generate size
25 markers for the analysis of wild-type and mutant RNAs in the sample population. Thus each analysis will require two ribozymes, two substrates and one unknown sample which will be combined into six reactions. The presence of cleavage products will be determined using an RNase protection assay so that full-length and cleavage fragments
30 of each RNA can be analyzed in one lane of a polyacrylamide gel. It is not absolutely required to quantify the results to gain insight into the expression of mutant RNAs and putative risk of the desired phenotypic changes in
35 target cells. The expression of mRNA whose protein product is implicated in the development of the phenotype (i.e., flt-1, KDR and/or flk-1) is adequate to establish

risk. If probes of comparable specific activity are used for both transcripts, then a qualitative comparison of RNA levels will be adequate and will decrease the cost of the initial diagnosis. Higher mutant form to wild-type ratios
5 will be correlated with higher risk whether RNA levels are compared qualitatively or quantitatively.

Other embodiments are within the following claims.

Table ICharacteristics of RibozymesGroup I Introns

Size: -200 to >1000 nucleotides

- 5 Requires a U in the target sequence immediately 5' of the cleavage site.

Binds 4-6 nucleotides at 5' side of cleavage site.

Over 75 known members of this class. Found in *Tetrahymena thermophila* rRNA, fungal mitochondria, chloroplasts, phage

- 10 T4, blue-green algae, and others.

RNaseP RNA (M1 RNA)

Size: -290 to 400 nucleotides

RNA portion of a ribonucleoprotein enzyme. Cleaves tRNA precursors to form mature tRNA.

- 15 Roughly 10 known members of this group all are bacterial in origin.

Hammerhead Ribozyme

Size: -13 to 40 nucleotides.

- 20 Requires the target sequence UH immediately 5' of the cleavage site.

Binds a variable number of nucleotides on both sides of the cleavage site.

14 known members of this class. Found in a number of plant pathogens (virusoids) that use RNA as the infectious

- 25 agent (Figure 1 and 2)

Hairpin Ribozyme

Size: -50 nucleotides.

Requires the target sequence GUC immediately 3' of the cleavage site.

- 30 Binds 4-6 nucleotides at 5' side of the cleavage site and a variable number to the 3' side of the cleavage site.

Only 3 known member of this class. Found in three plant pathogen (satellite RNAs of the tobacco ringspot virus,

arabis mosaic virus and chicory yellow mottle virus) which uses RNA as the infectious agent (Figure 3).

Hepatitis Delta Virus (HDV) Ribozyme

Size: 50-60 nucleotides (at present)

5 Sequence requirements not fully determined.

Binding sites and structural requirements not fully determined, although no sequences 5' of cleavage site are required.

Only 1 known member of this class. Found in human HDV
10 (Figure 4).

Neurospora VS RNA Ribozyme

Size: -144 nucleotides (at present)

Cleavage of target RNAs recently demonstrated.

Sequence requirements not fully determined.

15 Binding sites and structural requirements not fully determined. Only 1 known member of this class. Found in *Neurospora* VS RNA (Figure 5).

Table II: Human *flt1* VEGF Receptor-Hammerhead Ribozyme and Substrate Sequence

20	nt. Posi- tion	HH Ribozyme	Substrate
	10	GCCGAGAG CUGAUGA X GAA AGUGUCCG	CGGACACUC CUCUCGGC
	13	GGAGCCGA CUGAUGA X GAA AGGAGUGU	ACACUCCUC UCGGCUCC
25	15	GAGGAGCC CUGAUGA X GAA AGAGGAGU	ACUCCUCUC GGCUCCUC
	20	CCGGGGGAG CUGAUGA X GAA AGCCGAGA	UCUCGGCUC CUCCCCGG
	23	CUGCCGGG CUGAUGA X GAA AGGAGCCG	CGGCUCUCU CCCGGCAG
	43	CCCGCUCC CUGAUGA X GAA AGCCGCCG	CGGCGGCUC GGAGCGGG
	54	GAGCCCCG CUGAUGA X GAA AGCCCGCU	AGCGGGCUC CGGGGCUC
30	62	CUGCACCC CUGAUGA X GAA AGCCCCGG	CCGGGGCUC GGGUGCAG
	97	CCCCGGGU CUGAUGA X GAA AUCCUCGC	GCGAGGAUU ACCCGGGG
	98	UCCCCGGG CUGAUGA X GAA AAUCCUCG	CGAGGAUUA CCCGGGGA

	113	CAGGAGAC	CUGAUGA	X	GAA	ACCACUUC	GAAGUGGUU	GUCUCCUG
	116	AGCCAGGA	CUGAUGA	X	GAA	ACAACCAC	GUGGUUGUC	UCCUGGCU
	118	CCAGCCAG	CUGAUGA	X	GAA	AGACAACC	GGUUGUCUC	CUGGCUGG
	145	CGCGCCCU	CUGAUGA	X	GAA	AGCGCCCG	CGGGCGCUC	AGGGCGCG
5	185	GGCCGCCA	CUGAUGA	X	GAA	AGUCCGUC	GACGGACUC	UGGCGGCC
	198	CGGCCAAC	CUGAUGA	X	GAA	ACCCGGCC	GGCCGGGUC	GUUGGCCG
	201	CCCCGGCC	CUGAUGA	X	GAA	ACGACCCG	CGGGUCGUU	GGCCGGGG
	240	GUGAGCGC	CUGAUGA	X	GAA	ACGCGGCC	GGCCGCGUC	GCGCUCAC
	246	ACCAUGGU	CUGAUGA	X	GAA	AGCGCGAC	GUCGCGCUC	ACCAUGGU
10	255	CAGUAGCU	CUGAUGA	X	GAA	ACCAUGGU	ACCAUGGUC	AGCUACUG
	260	UGUCCCAG	CUGAUGA	X	GAA	AGCUGACC	GGUCAGCUA	CUGGGACA
	276	CACAGCAG	CUGAUGA	X	GAA	ACCCCGGU	ACCGGGGUC	CUGCUGUG
	294	AGACAGCU	CUGAUGA	X	GAA	AGCAGCGC	GCGCUGCUC	AGCUGUCU
	301	GAGAAGCA	CUGAUGA	X	GAA	ACAGCUGA	UCAGCUGUC	UGCUCUCUC
15	306	CCUGUGAG	CUGAUGA	X	GAA	AGCAGACA	UGUCUGCUU	CUCACAGG
	307	UCCUGUGA	CUGAUGA	X	GAA	AAGCAGAC	GUCUGCUUC	UCACAGGA
	309	GAUCCUGU	CUGAUGA	X	GAA	AGAAGCAG	CUGCUUCUC	ACAGGAUC
	317	CUGAACUA	CUGAUGA	X	GAA	AUCCUGUG	CACAGGAUC	UAGUUCAG
	319	ACCUGAAC	CUGAUGA	X	GAA	AGAUCCUG	CAGGAUCUA	GUUCAGGU
20	322	UGAACCU	CUGAUGA	X	GAA	ACUAGAUC	GAUCUAGUU	CAGGUUCA
	323	UUGAACCU	CUGAUGA	X	GAA	AACUAGAU	AUCUAGUUC	AGGUUCA
	328	UAAUUUUG	CUGAUGA	X	GAA	ACCUGAAC	GUUCAGGUU	CAAAAUUA
	329	UUAUUUUU	CUGAUGA	X	GAA	AACCUGAA	UUCAGGUUC	AAAAUUA
	335	GAUCUUUU	CUGAUGA	X	GAA	AUUUUGAA	UUCAAAAUU	AAAAGauc
25	336	GGAUCUUU	CUGAUGA	X	GAA	AAUUUUGA	UCAAAAUUA	AAAGAUCC
	343	CAGUUCAG	CUGAUGA	X	GAA	AUCUUUUA	UAAAAGAU	CUGAACUG
	355	GCCUUUUA	CUGAUGA	X	GAA	ACUCAGUU	AACUGAGUU	UAAAAGGC
	356	UGCCUUUU	CUGAUGA	X	GAA	AACUCAGU	ACUGAGUUU	AAAAGGCA
	357	GUGCCUUU	CUGAUGA	X	GAA	AAACUCAG	CUGAGUUUA	AAAGGCAC
30	375	GCUUGCAU	CUGAUGA	X	GAA	AUGUGCUG	CAGCACAU	AUGCAAGC
	400	GCAUUGGA	CUGAUGA	X	GAA	AUGCAGUG	CACUGCAUC	UCCAAUGC
	402	CUGCAUUG	CUGAUGA	X	GAA	AGAUGCAG	CUGCAUCUC	CAAUGCAG
	427	AGACCAUU	CUGAUGA	X	GAA	AUGGGCUG	CAGCCCAUA	AAUGGUCU

	434	CAGGCAAA	CUGAUGA	X	GAA	ACCAUUUA	UAAAUGGUC	UUUGCCUG
	436	UUCAGGCA	CUGAUGA	X	GAA	AGACCAUU	AAUGGUCUU	UGCCUGAA
	437	UUUCAGGC	CUGAUGA	X	GAA	AAGACCAU	AUGGUCUUU	GCCUGAAA
	454	GCUUUCU	CUGAUGA	X	GAA	ACUCACCA	UGGUGAGUA	AGGAAAGC
5	477	GAUUUAGU	CUGAUGA	X	GAA	AUGCUCAG	CUGAGCAUA	ACUAAAUC
	481	GGCAGAUU	CUGAUGA	X	GAA	AGUUAUGC	GCAUAACUA	AAUCUGCC
	485	CACAGGCA	CUGAUGA	X	GAA	AUUUAGUU	AACUAAAUC	UGCCUGUG
	512	UACUGCAG	CUGAUGA	X	GAA	AUUGUUUG	CAAACAAU	CUGCAGUA
	513	GUACUGCA	CUGAUGA	X	GAA	AAUUGUUU	AAACAAUUC	UGCAGUAC
10	520	GGUAAAAG	CUGAUGA	X	GAA	ACUGCAGA	UCUGCAGUA	CUUUAACC
	523	CAAGGUUA	CUGAUGA	X	GAA	AGUACUGC	GCAGUACUU	UAACCUUG
	524	UCAAGGUU	CUGAUGA	X	GAA	AAGUACUG	CAGUACUUU	AACCUUGA
	525	UUCAAGGU	CUGAUGA	X	GAA	AAAGUACU	AGUACUUUA	ACCUUGAA
	530	CUGUGUUC	CUGAUGA	X	GAA	AGGUUAAA	UUUAACCUU	GAACACAG
15	541	GUUUGCUU	CUGAUGA	X	GAA	AGCUGUGU	ACACAGCUC	AAGCAAAC
	560	AGCUGUAG	CUGAUGA	X	GAA	AGCCAGUG	CACUGGCUU	CUACAGCU
	561	CAGCUGUA	CUGAUGA	X	GAA	AAGCCAGU	ACUGGCUUC	UACAGCUG
	563	UGCAGCUG	CUGAUGA	X	GAA	AGAAGCCA	UGGCUUCUA	CAGCUGCA
	575	CAGCUAGA	CUGAUGA	X	GAA	AUUUGCAG	CUGCAAUA	UCUAGCUG
20	577	UACAGCUA	CUGAUGA	X	GAA	AUAUUUGC	GCAAUAUUC	UAGCUGUA
	579	GGUACAGC	CUGAUGA	X	GAA	AGAUUUU	AAUAUUCUA	GCUGUACC
	585	GAAGUAGG	CUGAUGA	X	GAA	ACAGCUAG	CUAGCUGUA	CCUACUUC
	589	CUUUGAAG	CUGAUGA	X	GAA	AGGUACAG	CUGUACCUA	CUUCAAG
	592	CUUCUUUG	CUGAUGA	X	GAA	AGUAGGUA	UACCUACUU	CAAAGAAG
25	593	UCUUCUUU	CUGAUGA	X	GAA	AAGUAGGU	ACCUACUUC	AAAGAAGA
	614	AGAUUGCA	CUGAUGA	X	GAA	AUUCUGUU	AACAGAAUC	UGCAAUCU
	621	AAUAUAUA	CUGAUGA	X	GAA	AUUGCAGA	UCUGCAAUC	UAUAUAUU
	623	UAAUAUA	CUGAUGA	X	GAA	AGAUUGCA	UGCAAUCUA	UAUAUUUA
	625	AAUAAUA	CUGAUGA	X	GAA	AUAGAUUG	CAAUCUAUA	UAUUUAUU
30	627	CUAAUAAA	CUGAUGA	X	GAA	AUAUAGAU	AUCUAUAUA	UUUAUUAG
	629	CACUAUA	CUGAUGA	X	GAA	AUAUAUAG	CUAUAUAUU	UAUUAGUG
	630	UCACUAAU	CUGAUGA	X	GAA	AAUAUAUA	UAUAUAUUU	AUUAGUGA
	631	AUCACUAA	CUGAUGA	X	GAA	AAUAUAUU	AUAUAUUUA	UUAGUGAU

	633	GUUUCACU	CUGAUGA	X	GAA	AUAAAUAU	AUUAUUUAU	AGUGAUAC
	634	UGUAUCAC	CUGAUGA	X	GAA	AAUAAAUA	UAUUUAUUA	GUGAUACA
	640	UCUACCUG	CUGAUGA	X	GAA	AUCACUAA	UUAGUGAUA	CAGGUAGA
	646	GAAAGGUC	CUGAUGA	X	GAA	ACCUGUAU	AUACAGGUA	GACCUUUC
5	652	CUCUACGA	CUGAUGA	X	GAA	AGGUCUAC	GUAGACCUU	UCGUAGAG
	653	UCUCUACG	CUGAUGA	X	GAA	AAGGUCUA	UAGACCUUU	CGUAGAGA
	654	AUCUCUAC	CUGAUGA	X	GAA	AAAGGUCU	AGACCUUUC	GUAGAGAU
	657	UACAUUCU	CUGAUGA	X	GAA	ACGAAAGG	CCUUUCGUA	GAGAUGUA
	665	UUUCACUG	CUGAUGA	X	GAA	ACAUCUCU	AGAGAUGUA	CAGUGAAA
10	675	AUUUCGGG	CUGAUGA	X	GAA	AUUUCACU	AGUGAAAU	CCCGAAAU
	684	AUGUGUAU	CUGAUGA	X	GAA	AUUUCGGG	CCCGAAAU	AUACACAU
	685	CAUGUGUA	CUGAUGA	X	GAA	AAUUUCGG	CCGAAAUUA	UACACAUG
	687	GUCAUGUG	CUGAUGA	X	GAA	AUAAUUUC	GAAAUUAUA	CACAUGAC
	711	GGAAUGAC	CUGAUGA	X	GAA	AGCUCCCU	AGGGAGCUC	GUCAUUC
15	714	CAGGGAAU	CUGAUGA	X	GAA	ACGAGCUC	GAGCUCGUC	AUUCCTUG
	717	CGGCAGGG	CUGAUGA	X	GAA	AUGACGAG	CUCGUCAUU	CCCUGCCG
	718	CCGGCAGG	CUGAUGA	X	GAA	AAUGACGA	UCGUCAUUC	CCUGCCGG
	729	GGUGACGU	CUGAUGA	X	GAA	ACCCGGCA	UGCCGGGUU	ACGUCACC
	730	AGGUGACG	CUGAUGA	X	GAA	AACCCGGC	GCCGGGUUA	CGUCACCU
20	734	UGUUAGGU	CUGAUGA	X	GAA	ACGUAACC	GGUUACGUC	ACCUAACA
	739	AGUGAUGU	CUGAUGA	X	GAA	AGGUGACG	CGUCACCUA	ACAUCACU
	744	GUAACAGU	CUGAUGA	X	GAA	AUGUUAGG	CCUAACAUC	ACUGUUAC
	750	UUUAAAGU	CUGAUGA	X	GAA	ACAGUGAU	AUCACUGUU	ACUUUAAA
	751	UUUAAAG	CUGAUGA	X	GAA	AACAGUGA	UCACUGUUA	CUUUAAAA
25	754	CUUUUUUA	CUGAUGA	X	GAA	AGUAACAG	CUGUUACUU	UAAAAAAG
	755	ACUUUUUU	CUGAUGA	X	GAA	AAGUAACA	UGUUACUUU	AAAAAAGU
	756	AACUUUUU	CUGAUGA	X	GAA	AAAGUAAC	GUUACUUUA	AAAAAGUU
	764	CAAGUGGA	CUGAUGA	X	GAA	ACUUUUUU	AAAAAAGUU	UCCACUUG
	765	UCAAGUGG	CUGAUGA	X	GAA	AACUUUUU	AAAAAGUUU	CCACUUGA
30	766	GUCAAGUG	CUGAUGA	X	GAA	AAACUUUU	AAAAGUUUC	CACUUGAC
	771	AAAGUGUC	CUGAUGA	X	GAA	AGUGGAAA	UUUCCACUU	GACACUUU
	778	AGGGAUCA	CUGAUGA	X	GAA	AGUGUCAA	UUGACACUU	UGAUCCCU
	779	CAGGGAUC	CUGAUGA	X	GAA	AAGUGUCA	UGACACUUU	GAUCCCTUG

783	CCAUCAGG	CUGAUGA	X	GAA	AUCAAAGU	ACUUUGAUC	CCUGAUGG
801	UCCCAGAU	CUGAUGA	X	GAA	AUGCGUUU	AAACGCAUA	AUCUGGGA
804	CUGUCCCA	CUGAUGA	X	GAA	AUUAUGCG	CGCAUAAUC	UGGGACAG
814	GCCCUUUC	CUGAUGA	X	GAA	ACUGUCCC	GGGACAGUA	GAAAGGGC
5	824	AUAUGAUG	CUGAUGA	X	GAA	AGCCCUUU	AAAGGGCUU CAUCAUUAU
	825	GAUAUGAU	CUGAUGA	X	GAA	AAGCCCUU	AAGGGCUUC AUCAUAUC
	828	UUUGAUUA	CUGAUGA	X	GAA	AUGAAGCC	GGCUUCAUC AUAUCAAA
	831	GCAUUUGA	CUGAUGA	X	GAA	AUGAUGAA	UUCAUCAUA UCAAAUGC
	833	UUGCAUUU	CUGAUGA	X	GAA	AUAUGAUG	CAUCAUAUC AAAUGCAA
10	845	UUUCUUUG	CUGAUGA	X	GAA	ACGUUGCA	UGCAACGUA CAAAGAAA
	855	AGAAGCCC	CUGAUGA	X	GAA	AUUUCUUU	AAAGAAUA GGGCUUCU
	861	CAGGUCAG	CUGAUGA	X	GAA	AGCCCUAU	AUAGGGCUU CUGACCUG
	862	ACAGGUCA	CUGAUGA	X	GAA	AAGCCCUA	UAGGGCUUC UGACCUGU
	882	UGCCCAU	CUGAUGA	X	GAA	ACUGUUGC	GCAACAGUC AAUGGGCA
15	892	CUUAUACA	CUGAUGA	X	GAA	AUGCCCAU	AUGGGCAUU UGUUAUAG
	893	UCUUAUAC	CUGAUGA	X	GAA	AAUGCCCA	UGGGCAUUU GUUAAGA
	896	UUGUCUUA	CUGAUGA	X	GAA	ACAAAUGC	GCAUUGUA UAAGACAA
	898	GUUUGUCU	CUGAUGA	X	GAA	AUACAAAU	AUUUGUAUA AGACAAAC
	908	GUGUGAGA	CUGAUGA	X	GAA	AGUUUGUC	GACAAACUA UCUCACAC
20	910	AUGUGUGA	CUGAUGA	X	GAA	AUAGUUUG	CAAACUAUC UCACACAU
	912	CGAUGUGU	CUGAUGA	X	GAA	AGAUAGUU	AACUAUCUC ACACAUCG
	919	GGUUUGUC	CUGAUGA	X	GAA	AUGUGUGA	UCACACAUC GACAAACC
	931	UAUGAUUG	CUGAUGA	X	GAA	AUUGGUUU	AAACCAUA CAAUCAUA
	936	ACAUCUAU	CUGAUGA	X	GAA	AUUGUAUU	AAUACAAUC AUAGAUGU
25	939	UGGACAUC	CUGAUGA	X	GAA	AUGAUUGU	ACAAUCAUA GAUGUCCA
	945	CUUAUUUG	CUGAUGA	X	GAA	ACAUCUAU	AUAGAUGUC CAAUAUAG
	951	GGUGUGCU	CUGAUGA	X	GAA	AUUUGGAC	GUCCAAUA AGCACACC
	969	AGUAAUUU	CUGAUGA	X	GAA	ACUGGGCG	CGCCCAGUC AAAUUACU
	974	CUCUAAGU	CUGAUGA	X	GAA	AUUUGACU	AGUCAAAU ACUUAGAG
30	975	CCUCUAAG	CUGAUGA	X	GAA	AAUUUGAC	GUCAAAUA CUUAGAGG
	978	UGGCCUCU	CUGAUGA	X	GAA	AGUAAUUU	AAAUUACUU AGAGGCCA
	979	AUGGCCUC	CUGAUGA	X	GAA	AAGUAAUU	AAUUACUUA GAGGCCAU
	988	GACAAGAG	CUGAUGA	X	GAA	AUGGCCUC	GAGGCCAUA CUCUUGUC

	991	GAGGACAA	CUGAUGA	X	GAA	AGUAUGGC	GCCAUACUC	UUGUCCUC
	993	UUGAGGAC	CUGAUGA	X	GAA	AGAGUAUG	CAUACUCUU	GUCCUCA
	996	CAAUUGAG	CUGAUGA	X	GAA	ACAAGAGU	ACUCUUGUC	CUCAAUUG
	999	GUACAAUU	CUGAUGA	X	GAA	AGGACAAG	CUUGUCCUC	AAUUGUAC
5	1003	AGCAGUAC	CUGAUGA	X	GAA	AUUGAGGA	UCCUCAAUU	GUACUGCU
	1006	GGUAGCAG	CUGAUGA	X	GAA	ACAAUUGA	UCAAUUGUA	CUGCUACC
	1012	GGGAGUGG	CUGAUGA	X	GAA	AGCAGUAC	GUACUGCUA	CCACUCCC
	1018	GUUCAAGG	CUGAUGA	X	GAA	AGUGGUAG	CUACCACUC	CCUUGAAC
	1022	UCGUGUUC	CUGAUGA	X	GAA	AGGGAGUG	CACUCCCUU	GAACACGA
10	1035	GUCAUUUG	CUGAUGA	X	GAA	ACUCUCGU	ACGAGAGUU	CAAUGAC
	1036	GGUCAUUU	CUGAUGA	X	GAA	AACUCUCG	CGAGAGUUC	AAAUGACC
	1051	AUCAGGGU	CUGAUGA	X	GAA	ACUCCAGG	CCUGGAGUU	ACCCUGAU
	1052	CAUCAGGG	CUGAUGA	X	GAA	AACUCCAG	CUGGAGUUA	CCCUGAUG
	1069	AGCUCUCU	CUGAUGA	X	GAA	AUUUUUUU	AAAAAAUA	AGAGAGCU
15	1078	CCUUACGG	CUGAUGA	X	GAA	AGCUCUCU	AGAGAGCUU	CCGUAAGG
	1079	GCCUUACG	CUGAUGA	X	GAA	AAGCUCUC	GAGAGCUUC	CGUAAGGC
	1083	CGUCGCCU	CUGAUGA	X	GAA	ACGGAAGC	GCUUCCGUA	AGGCGACG
	1095	CUUUGGUC	CUGAUGA	X	GAA	AUUCGUCG	CGACGAAUU	GACCAAAG
	1108	GGCAUGGG	CUGAUGA	X	GAA	AUUGCUUU	AAAGCAAUU	CCCAUGCC
20	1109	UGGCAUGG	CUGAUGA	X	GAA	AAUUGCUU	AAGCAAUUC	CCAUGCCA
	1122	CUGUAGAA	CUGAUGA	X	GAA	AUGUUGGC	GCCACAUA	UUCUACAG
	1124	CACUGUAG	CUGAUGA	X	GAA	AUAUGUUG	CAACAUUUU	CUACAGUG
	1125	ACACUGUA	CUGAUGA	X	GAA	AAUAUGUU	AACAUUUUC	UACAGUGU
	1127	GAACACUG	CUGAUGA	X	GAA	AGAAUAUG	CAUAUUCUA	CAGUGUUC
25	1134	AUAGUAAG	CUGAUGA	X	GAA	ACACUGUA	UACAGUGUU	CUUACUUA
	1135	AAUAGUAA	CUGAUGA	X	GAA	AACACUGU	ACAGUGUUC	UUACUUAU
	1137	UCAAUAGU	CUGAUGA	X	GAA	AGAACACU	AGUGUUCUU	ACUUAUGA
	1138	GUCAAUAG	CUGAUGA	X	GAA	AAGAACAC	GUGUUCUUA	CUAUUGAC
	1141	UUUGUCAA	CUGAUGA	X	GAA	AGUAAGAA	UUCUUACUA	UUGACAAA
30	1143	AUUUUGUC	CUGAUGA	X	GAA	AUAGUAAG	CUUACUUAU	GACAAAUA
	1173	CAAGUAUA	CUGAUGA	X	GAA	AGUCCUUU	AAAGGACUU	UAUACUUG
	1174	ACAAGUAU	CUGAUGA	X	GAA	AAGUCCUU	AAGGACUUU	AUACUUGU
	1175	GACAAGUA	CUGAUGA	X	GAA	AAAGUCCU	AGGACUUUA	UACUUGUC

	1177	ACGACAAG	CUGAUGA	X	GAA	AUAAAGUC	GACUUUAUA	CUUGUCGU
	1180	UACACGAC	CUGAUGA	X	GAA	AGUAUAAA	UUUAUACTU	GUCGUGUA
	1183	CCUUACAC	CUGAUGA	X	GAA	ACAAGUAU	AUACTUUGUC	GUGUAAGG
	1188	CCACUCCU	CUGAUGA	X	GAA	ACACGACA	UGUCGUGUA	AGGAGUGG
5	1202	AUUUGAAU	CUGAUGA	X	GAA	AUGGUCCA	UGGACCAUC	AUUCAAAU
	1205	CAGAUUUG	CUGAUGA	X	GAA	AUGAUGGU	ACCAUCAU	CAAAUCUG
	1206	ACAGAUUU	CUGAUGA	X	GAA	AAUGAUGG	CCAUCAUUC	AAAUCUGU
	1211	UGUUAACA	CUGAUGA	X	GAA	AUUUGAAU	AUUCAAAUC	UGUUAACA
	1215	GAGGUGUU	CUGAUGA	X	GAA	ACAGAUUU	AAAUCUGUU	AACACCUC
10	1216	UGAGGUGU	CUGAUGA	X	GAA	AACAGAUU	AAUCUGUUA	ACACCUCA
	1223	UAUGCACU	CUGAUGA	X	GAA	AGGUGUUA	UACACCUC	AGUGCAUA
	1231	AUCAUUA	CUGAUGA	X	GAA	AUGCACUG	CAGUGCAUA	UAUAUGAU
	1233	UUUAUUA	CUGAUGA	X	GAA	AUAUGCAC	GUGCAUUA	UAUGAUAA
	1235	CUUUUAUC	CUGAUGA	X	GAA	AUAUAUGC	GCAUAUUA	UGAUAAAG
15	1240	GAAUGCUU	CUGAUGA	X	GAA	AUCAUUA	UAUAUGAU	AAGCAUUC
	1247	CAGUGAUG	CUGAUGA	X	GAA	AUGCUUUA	UAAAGCAU	CAUCACUG
	1248	ACAGUGAU	CUGAUGA	X	GAA	AAUGCUUU	AAAGCAUUC	AUCACUGU
	1251	UUCACAGU	CUGAUGA	X	GAA	AUGAAUGC	GCAUUCAU	ACUGUGAA
	1264	CUGUUUUC	CUGAUGA	X	GAA	AUGUUUCA	UGAAACAUC	GAAAACAG
20	1281	ACGGUUUC	CUGAUGA	X	GAA	AGCACCUG	CAGGUGCU	GAAACCGU
	1290	UUGCCAGC	CUGAUGA	X	GAA	ACGGUUUC	GAAACCGUA	GCUGGCAA
	1304	GCCGGUAA	CUGAUGA	X	GAA	ACCGCUUG	CAAGCGGUC	UUACCGGC
	1306	GAGCCGGU	CUGAUGA	X	GAA	AGACCGCU	AGCGGUCU	ACCGGCUC
	1307	AGAGCCGG	CUGAUGA	X	GAA	AAGACCGC	GCGGUCUUA	CCGGCUCU
25	1314	UUCAUAGA	CUGAUGA	X	GAA	AGCCGGUA	UACCGGCUC	UCUAUGAA
	1316	CUUUCAU	CUGAUGA	X	GAA	AGAGCCGG	CCGGCUCUC	UAUGAAAG
	1318	CACUUUCA	CUGAUGA	X	GAA	AGAGAGCC	GGCUCUCUA	UGAAAGUG
	1334	GCGAGGGA	CUGAUGA	X	GAA	AUGCCUUC	GAAGGCAU	UCCUCGCG
	1335	GGCGAGGG	CUGAUGA	X	GAA	AAUGCCU	AAGGCAUU	CCCUCGCC
30	1336	CGGCGAGG	CUGAUGA	X	GAA	AAAUGCCU	AGGCAUUUC	CCUCGCCG
	1340	CUUCCGGC	CUGAUGA	X	GAA	AGGGAAAU	AUUUCCUC	GCCGGAAG
	1350	AACCAUAC	CUGAUGA	X	GAA	ACUCCGG	CCGGAAGU	GUAUGGUU
	1353	UUUAACCA	CUGAUGA	X	GAA	ACAACUUC	GAAGUUGUA	UGGUUAAA

	1358	CAUCUUUU	CUGAUGA	X	GAA	ACCAUACA	UGUAUGGUU	AAAAGAUG
	1359	CCAUCUUU	CUGAUGA	X	GAA	AACCAUAC	GUAUGGUUA	AAAGAUGG
	1370	UCGCAGGU	CUGAUGA	X	GAA	ACCCAUCU	AGAUGGGUU	ACCUGCGA
	1371	GUCGCAGG	CUGAUGA	X	GAA	AACCCAUC	GAUGGGUUA	CCUGCGAC
5	1388	AGCGAGCA	CUGAUGA	X	GAA	AUUUCUCA	UGAGAAAUC	UGCUCGCU
	1393	CAAUAGC	CUGAUGA	X	GAA	AGCAGAUU	AAUCUGCUC	GCUAUUUG
	1397	GAGUCAA	CUGAUGA	X	GAA	AGCGAGCA	UGCUCGCUA	UUUGACUC
	1399	ACGAGUCA	CUGAUGA	X	GAA	AUAGCGAG	CUCGCUAUU	UGACUCGU
	1400	CACGAGUC	CUGAUGA	X	GAA	AAUAGCGA	UCGCUAUUU	GACUCGUG
10	1405	GUAGCCAC	CUGAUGA	X	GAA	AGUCAAAU	AUUUGACUC	GUGGCUAC
	1412	UUAACGAG	CUGAUGA	X	GAA	AGCCACGA	UCGUGGCUA	CUCGUUAA
	1415	UAAUUAAC	CUGAUGA	X	GAA	AGUAGCCA	UGGCUACUC	GUUAAUUA
	1418	UGAUAAU	CUGAUGA	X	GAA	ACGAGUAG	CUACUCGUU	AAUUAUCA
	1419	UUGAUAAU	CUGAUGA	X	GAA	AACGAGUA	UACUCGUUA	AUUAUCAA
15	1422	UCCUUGAU	CUGAUGA	X	GAA	AUUAACGA	UCGUUAAU	AUCAAGGA
	1423	GUCCUUGA	CUGAUGA	X	GAA	AAUUAACG	CGUUAUUA	UCAAGGAC
	1425	ACGUCCU	CUGAUGA	X	GAA	AUAAUUA	UUAUUAUC	AAGGACGU
	1434	UCUUCAGU	CUGAUGA	X	GAA	ACGUCCU	AAGGACGUA	ACUGAAGA
	1456	GAUUGU	CUGAUGA	X	GAA	AUUCUCCU	CAGGGAAU	AUACAAUC
20	1457	AGAUUGUA	CUGAUGA	X	GAA	AAUUCUCCU	AGGGAAUUA	UACAAUCU
	1459	CAAGAUUG	CUGAUGA	X	GAA	AUAAUUCU	GGAAUUAUA	CAAUUUG
	1464	CUCAGCAA	CUGAUGA	X	GAA	AUUGUAUA	UAUACAAUC	UUGCUGAG
	1466	UGCUCAGC	CUGAUGA	X	GAA	AGAUUGUA	UACAAUCU	GCUGAGCA
	1476	GACUGUUU	CUGAUGA	X	GAA	AUGCUCAG	CUGAGCAUA	AAACAGUC
25	1484	ACACAUUU	CUGAUGA	X	GAA	ACUGUUUU	AAAACAGUC	AAUUGUGU
	1493	GGUUUUUA	CUGAUGA	X	GAA	ACACAUUU	AAUUGUGUU	UAAAAACC
	1494	AGGUUUUU	CUGAUGA	X	GAA	AACACAUU	AAUUGUGUU	AAAAACCU
	1495	GAGGUUUU	CUGAUGA	X	GAA	AAACACAU	AUGUGUUUA	AAAACCUC
	1503	GUGGCAGU	CUGAUGA	X	GAA	AGGUUUUU	AAAAACCUC	ACUGCCAC
30	1513	GACAAUUA	CUGAUGA	X	GAA	AGUGGCAG	CUGCCACUC	UAAUUGUC
	1515	UUGACAAU	CUGAUGA	X	GAA	AGAGUGGC	GCCACUCUA	AUUGUCAA
	1518	ACAUUGAC	CUGAUGA	X	GAA	AUUAGAGU	ACUCUAAU	GUCAAUGU
	1521	UUCACAUU	CUGAUGA	X	GAA	ACAAUUG	CUAAUUGUC	AAUGUGAA

	1539	UUUUCGUA	CUGAUGA	X	GAA	AUCUGGGG	CCCCAGAUU	UACGAAAA
	1540	CUUUUCGU	CUGAUGA	X	GAA	AAUCUGGG	CCCAGAUUU	ACGAAAAG
	1541	CCUUUUCG	CUGAUGA	X	GAA	AAAUCUGG	CCAGAUUUA	CGAAAAGG
	1556	GAAACGAU	CUGAUGA	X	GAA	ACACGGCC	GGCCGUGUC	AUCGUUUC
5	1559	CUGGAAAC	CUGAUGA	X	GAA	AUGACACG	CGUGUCAUC	GUUCCAG
	1562	GGUCUGGA	CUGAUGA	X	GAA	ACGAUGAC	GUCAUCGUU	UCCAGACC
	1563	GGGUCUGG	CUGAUGA	X	GAA	AACGAUGA	UCAUCGUUU	CCAGACCC
	1564	CGGGUCUG	CUGAUGA	X	GAA	AAACGAUG	CAUCGUUUC	CAGACCCG
	1576	UGGGUAGA	CUGAUGA	X	GAA	AGCCGGGU	ACCCGGCUC	UCUACCCA
10	1578	AGUGGGUA	CUGAUGA	X	GAA	AGAGCCGG	CCGGCUCUC	UACCCACU
	1580	CCAGUGGG	CUGAUGA	X	GAA	AGAGAGCC	GGCUCUCUA	CCCACUGG
	1602	CAAGUCAG	CUGAUGA	X	GAA	AUUUGUCU	AGACAAUUC	CUGACUUG
	1609	UGCGGUAC	CUGAUGA	X	GAA	AGUCAGGA	UCCUGACUU	GUACCGCA
	1612	AUAUGCGG	CUGAUGA	X	GAA	ACAAGUCA	UGACUUGUA	CCGCAUUA
15	1619	GGAUACCA	CUGAUGA	X	GAA	AUGCGGUA	UACCGCAUA	UGGUAUCC
	1624	UUGAGGGA	CUGAUGA	X	GAA	ACCAUAUG	CAUAUGGUA	UCCCUCAA
	1626	GGUUGAGG	CUGAUGA	X	GAA	AUACCAUA	UAUGGUAUC	CCUCAACC
	1630	UGUAGGUU	CUGAUGA	X	GAA	AGGGAUAC	GUAUCCUC	AACCUACA
	1636	CUUGAUUG	CUGAUGA	X	GAA	AGGUUGAG	CUCAACCUA	CAAUCAAG
20	1641	AACCACUU	CUGAUGA	X	GAA	AUUGUAGG	CCUACAAUC	AAGUGGUU
	1649	GGUGCCAG	CUGAUGA	X	GAA	ACCACUUG	CAAGUGGUU	CUGGCACC
	1650	GGGUGCCA	CUGAUGA	X	GAA	AACCACUU	AAGUGGUUC	UGGCACCC
	1663	AUUAUGGU	CUGAUGA	X	GAA	ACAGGGGU	ACCCUGUA	ACCAUAAU
	1669	GGAAUGAU	CUGAUGA	X	GAA	AUGGUUAC	GUAACCAUA	AUCAUUC
25	1672	UUCGGAU	CUGAUGA	X	GAA	AUUAUGGU	ACCAUAAUC	AUUCGAA
	1675	UGCUUCGG	CUGAUGA	X	GAA	AUGAUUUA	AUAAUCAUU	CCGAAGCA
	1676	UUGCUUCG	CUGAUGA	X	GAA	AAUGAUUA	UAAUCAUUC	CGAAGCAA
	1694	UGGAACAA	CUGAUGA	X	GAA	AGUCACAC	GUGUGACUU	UUGUCCAA
	1695	UUGGAACA	CUGAUGA	X	GAA	AAGUCACA	UGUGACUUU	UGUCCAA
30	1696	AUUGGAAC	CUGAUGA	X	GAA	AAAGUCAC	GUGACUUUU	GUUCCAAU
	1699	AUUAUUGG	CUGAUGA	X	GAA	ACAAAAGU	ACUUUUGUU	CCAAUAAU
	1700	CAUUAUUG	CUGAUGA	X	GAA	AACAAAAG	CUUUUGUUC	CAAUAAUG
	1705	CUCUUCAU	CUGAUGA	X	GAA	AUUGGAAC	GUUCCAAUA	AUGAAGAG

	1715	GGAUAAAG	CUGAUGA	X	GAA	ACUCUUA	UGAAGAGUC	CUUUAUCC
	1718	CCAGGAUA	CUGAUGA	X	GAA	AGGACUCU	AGAGUCCUU	UAUCCUGG
	1719	UCCAGGAU	CUGAUGA	X	GAA	AAGGACUC	GAGUCCUUU	AUCCUGGA
	1720	AUCCAGGA	CUGAUGA	X	GAA	AAAGGACU	AGUCCUUUA	UCCUGGAU
5	1722	GCAUCCAG	CUGAUGA	X	GAA	AUAAAGGA	UCCUUUAUC	CUGGAUGC
	1755	AUGCUCUC	CUGAUGA	X	GAA	AUUCUGUU	AACAGAAUU	GAGAGCAU
	1764	CGCUGAGU	CUGAUGA	X	GAA	AUGCUCUC	GAGAGCAUC	ACUCAGCG
	1768	CAUGCVCU	CUGAUGA	X	GAA	AGUGAUGC	GCAUCACUC	AGCGCAUG
	1782	CCUUCUUA	CUGAUGA	X	GAA	AUUGCCAU	AUGGCAAUA	AUAGAAGG
10	1785	UUUCCUUC	CUGAUGA	X	GAA	AUUAUUGC	GCAAUAAUA	GAAGGAAA
	1798	AGCCAUCU	CUGAUGA	X	GAA	AUUCUUUC	GAAAGAAUA	AGAUGGCU
	1807	CAAGGUGC	CUGAUGA	X	GAA	AGCCAUCU	AGAUGGCUA	GCACCUUG
	1814	CCACAACC	CUGAUGA	X	GAA	AGGUGCUA	UAGCACCUI	GGUUGUGG
	1818	UCAGCCAC	CUGAUGA	X	GAA	ACCAAGGU	ACCUUGGUU	GUGGCUGA
15	1829	AAAUUCUA	CUGAUGA	X	GAA	AGUCAGCC	GGCUGACUC	UAGAAUUU
	1831	AGAAUUC	CUGAUGA	X	GAA	AGAGUCAG	CUGACUCUA	GAAUUUCU
	1836	AUUC CAGA	CUGAUGA	X	GAA	AUUCUAGA	UCUAGAAUU	UCUGGAAU
	1837	GAUUC CAG	CUGAUGA	X	GAA	AAUUCUAG	CUAGAAUUU	CUGGAAUC
	1838	AGAUUCCA	CUGAUGA	X	GAA	AAAUUCUA	UAGAAUUUC	UGGAAUCU
20	1845	CAAAUGUA	CUGAUGA	X	GAA	AUUC CAGA	UCUGGAAUC	UACAUUUG
	1847	UGCAA AUG	CUGAUGA	X	GAA	AGAUUCCA	UGGAAUCUA	CAUUUGCA
	1851	GCUAUGCA	CUGAUGA	X	GAA	AUGUAGAU	AUCUACAUU	UGCAUAGC
	1852	AGCUAUGC	CUGAUGA	X	GAA	AAUGUAGA	UCUACAUUU	GCAUAGCU
	1857	UUGGAAGC	CUGAUGA	X	GAA	AUGCAA AU	AUUUGCAUA	GCUUCCAA
25	1861	UUUAUUGG	CUGAUGA	X	GAA	AGCUAUGC	GCAUAGCUU	CCAUA AAA
	1862	CUUUAUUG	CUGAUGA	X	GAA	AAGCUAUG	CAUAGCUUC	CAUAAAAG
	1867	CCCAACTU	CUGAUGA	X	GAA	AUUGGAAG	CUUCCAAUA	AAGUUGGG
	1872	ACAGUCCC	CUGAUGA	X	GAA	ACUUUAUU	AAUAAAAGU	GGGACTUGU
	1893	UAAAAGCU	CUGAUGA	X	GAA	AUGUUUCU	AGAAACAUA	AGCUUUUA
30	1898	UGAUUAUA	CUGAUGA	X	GAA	AGCUUAUG	CAUAAGCUU	UUUAUACA
	1899	GUGAUUAU	CUGAUGA	X	GAA	AAGCUUAU	AUAAGCUUU	UAUAUCAC
	1900	UGUGAUAU	CUGAUGA	X	GAA	AAAGCUUA	UAAGCUUUU	AUAUCACA
	1901	CUGUGAUA	CUGAUGA	X	GAA	AAAAGCUU	AAGCUUUUA	UAUCACAG

	1903	AUCUGUGA	CUGAUGA	X	GAA	AUAAAAGC	GCUUUUAUA	UCACAGAU
	1905	ACAUCUGU	CUGAUGA	X	GAA	AUAUAAAA	UUUUUAUUC	ACAGAUGU
	1925	UAACAUGA	CUGAUGA	X	GAA	ACCCAUUU	AAAUGGGUU	UCAUGUUA
	1926	UUAACAUG	CUGAUGA	X	GAA	AACCCAUU	AAUGGGUUU	CAUGUUA
5	1927	GUUAACAU	CUGAUGA	X	GAA	AAACCCAU	AUGGGUUUC	AUGUUAAC
	1932	UCCAAGUU	CUGAUGA	X	GAA	ACAUGAAA	UUUCAUGUU	AACUUGGA
	1933	UUCCAAGU	CUGAUGA	X	GAA	AACAUGAA	UUCAUGUUA	ACUUGGAA
	1937	UUUUUCC	CUGAUGA	X	GAA	AGUUAACA	UGUUAACUU	GGAAAAA
	1976	CUGUGCAA	CUGAUGA	X	GAA	ACAGUUUC	GAAACUGUC	UUGCACAG
10	1978	AACUGUGC	CUGAUGA	X	GAA	AGACAGUU	AACUGUCUU	GCACAGUU
	1986	AACUUGUU	CUGAUGA	X	GAA	ACUGUGCA	UGCACAGUU	AACAAGUU
	1987	GAACUUGU	CUGAUGA	X	GAA	AACUGUGC	GCACAGUUA	ACAAGUUC
	1994	UGUAUAAG	CUGAUGA	X	GAA	ACUUGUUA	UAACAAGUU	CUUAUACA
	1995	CUGUAUAA	CUGAUGA	X	GAA	AACUUGUU	AACAAGUUC	UUUACAG
15	1997	CUCUGUAU	CUGAUGA	X	GAA	AGAACUUG	CAAGUUCUU	AUACAGAG
	1998	UCUCUGUA	CUGAUGA	X	GAA	AAGAACUU	AAGUUCUUA	UACAGAGA
	2000	CGUCUCUG	CUGAUGA	X	GAA	AUAAGAAC	GUUCUUAUA	CAGAGACG
	2010	AUCCAAGU	CUGAUGA	X	GAA	ACGUCUCU	AGAGACGUU	ACUUGGAU
	2011	AAUCCAAG	CUGAUGA	X	GAA	AACGUCUC	GAGACGUUA	CUUGGAUU
20	2014	UAAAAUCC	CUGAUGA	X	GAA	AGUAACGU	ACGUUACUU	GGAUUUUA
	2019	CGCAGUAA	CUGAUGA	X	GAA	AUCCAAGU	ACUUGGAUU	UUACUGCG
	2020	CCGCAGUA	CUGAUGA	X	GAA	AAUCCAAG	CUUGGAUUU	UACUGCGG
	2021	UCCGCAGU	CUGAUGA	X	GAA	AAAUCCAA	UUGGAUUUU	ACUGCGGA
	2022	GUCCGCAG	CUGAUGA	X	GAA	AAAUCCA	UGGAUUUUA	CUGCGGAC
25	2034	CUGUUAUU	CUGAUGA	X	GAA	ACUGUCCG	CGGACAGUU	AAUAACAG
	2035	UCUGUUAU	CUGAUGA	X	GAA	AACUGUCC	GGACAGUUA	AUAACAGA
	2038	UGUUCUGU	CUGAUGA	X	GAA	AUUAACUG	CAGUUAUUA	ACAGAACA
	2054	UAAUACUG	CUGAUGA	X	GAA	AGUGCAUU	AAUGCACUA	CAGUAUUA
	2059	CUUGCUGA	CUGAUGA	X	GAA	ACUGUAGU	ACUACAGUA	UUAGCAAG
30	2061	UGCUUGCU	CUGAUGA	X	GAA	AUACUGUA	UACAGUAUU	AGCAAGCA
	2062	UUGCUUGC	CUGAUGA	X	GAA	AAUACUGU	ACAGUAUUA	GCAAGCAA
	2082	UCCUAGU	CUGAUGA	X	GAA	AUGGCCAU	AUGGCCAUC	ACUAAGGA
	2086	GUGCUCU	CUGAUGA	X	GAA	AGUGAUGG	CCAUCACUA	AGGAGCAC

	2096	GAGUGAUG	CUGAUGA	X	GAA	AGUGCUC	GGAGCACUC	CAUCACUC
	2100	UUAAGAGU	CUGAUGA	X	GAA	AUGGAGUG	CACUCCAUC	ACUCUJAA
	2104	AAGAUUAA	CUGAUGA	X	GAA	AGUGAUGG	CCAUCACUC	UUAUUCUJ
	2106	GUAAGAUU	CUGAUGA	X	GAA	AGAGUGAU	AUCACUCUJ	AAUCUJAC
5	2107	GGUAAGAU	CUGAUGA	X	GAA	AAGAGUGA	UCACUCUJA	AUCUJACC
	2110	GAUGGUAA	CUGAUGA	X	GAA	AUUAAGAG	CUCUJAAUC	UJACCAUC
	2112	AUGAUGGU	CUGAUGA	X	GAA	AGAUUAAG	CUUAAUCUJ	ACCAUCAU
	2113	CAUGAUGG	CUGAUGA	X	GAA	AAGAUJAA	UUAUUCUJA	CCAUCAUG
	2118	ACAUUCAU	CUGAUGA	X	GAA	AUGGUAA	CUUACCAUC	AUGAAUGU
10	2127	UGCAGGGA	CUGAUGA	X	GAA	ACAUUCAU	AUGAAUGUJ	UCCUGCA
	2128	UUGCAGGG	CUGAUGA	X	GAA	AACAUUCA	UGAAUGUJU	CCCUGCAA
	2129	CUUGCAGG	CUGAUGA	X	GAA	AAACAUUC	GAAUGUJUC	CCUGCAAG
	2140	GGUGCCUG	CUGAUGA	X	GAA	AUCUUGCA	UGCAAGAUJ	CAGGCACC
	2141	AGGUGCCU	CUGAUGA	X	GAA	AAUCUUGC	GCAAGAUUC	AGGCACCU
15	2150	UGCAGGCA	CUGAUGA	X	GAA	AGGUGCCU	AGGCACCUA	UGCCUGCA
	2172	CCUGUGUA	CUGAUGA	X	GAA	ACAUUCCU	AGGAAUGUA	UACACAGG
	2174	CCCCUGUG	CUGAUGA	X	GAA	AUACAUUC	GAAUGUAUA	CACAGGGG
	2190	UUCUGGAG	CUGAUGA	X	GAA	AUUUCUUC	GAAGAAUUC	CUCCAGAA
	2193	UUCUUCUG	CUGAUGA	X	GAA	AGGAUJUC	GAAAUCCUC	CAGAAGAA
20	2208	CUGAUUGU	CUGAUGA	X	GAA	AUUUCUJU	AAAGAAUJU	ACAAUCAG
	2209	UCUGAUUG	CUGAUGA	X	GAA	AAUJUCUJ	AAGAAUJUA	CAAUCAGA
	2214	UGAUCUCU	CUGAUGA	X	GAA	AUUGUAAU	AJUACAAUC	AGAGAUCA
	2221	UGCJUCCU	CUGAUGA	X	GAA	AUCUCUGA	UCAGAGAU	AGGAAGCA
	2234	GCAGGAGG	CUGAUGA	X	GAA	AUGGUGCU	AGCACCAUA	CCUCCUGC
25	2238	UUUCGCAG	CUGAUGA	X	GAA	AGGUAAUG	CCAUACCUC	CUGCGAAA
	2250	UGAUCACU	CUGAUGA	X	GAA	AGGUUUCG	CGAAACCUC	AGUGAUCA
	2257	CACUGUGU	CUGAUGA	X	GAA	AUCACUGA	UCAGUGAU	ACACAGUG
	2271	GAACUGCU	CUGAUGA	X	GAA	AUGGCCAC	GUGGCCAUC	AGCAGUUC
	2278	AGUGGUGG	CUGAUGA	X	GAA	ACUGCUGA	UCAGCAGUJ	CCACCACU
30	2279	AAGUGGUG	CUGAUGA	X	GAA	AACUGCUG	CAGCAGUUC	CACCACUJ
	2287	ACAGUCUA	CUGAUGA	X	GAA	AGUGGUGG	CCACCACUJ	UAGACUGU
	2288	GACAGUCU	CUGAUGA	X	GAA	AAGUGGUG	CACCACUJU	AGACUGUC
	2289	UGACAGUC	CUGAUGA	X	GAA	AAAGUGGU	ACCACUJUA	GACUGUCA

	2296	AUUAGCAU	CUGAUGA	X	GAA	ACAGUCUA	UAGACUGUC	AUGCUGAAU
	2302	GACACCAU	CUGAUGA	X	GAA	AGCAUGAC	GUCAUGCUA	AUGGUGUC
	2310	GGCUCGGG	CUGAUGA	X	GAA	ACACCAUU	AAUGGUGUC	CCCGAGCC
	2320	AGUGAUCU	CUGAUGA	X	GAA	AGGCUCGG	CCGAGCCUC	AGAUCACU
5	2325	AACCAAGU	CUGAUGA	X	GAA	AUCUGAGG	CCUCAGAU	ACUUGGUU
	2329	UUUAAACC	CUGAUGA	X	GAA	AGUGAUCU	AGAUCACUU	GGUUUAAA
	2333	UGUUUUUA	CUGAUGA	X	GAA	ACCAAGUG	CACUUGGUU	UAAAAACA
	2334	UUGUUUUU	CUGAUGA	X	GAA	AACCAAGU	ACUUGGUUU	AAAAACAA
	2335	GUUGUUUU	CUGAUGA	X	GAA	AAACCAAG	CUUGGUUUU	AAAACAAC
10	2352	UCUUGUUG	CUGAUGA	X	GAA	AUUUUGUG	CACAAAAUA	CAACAAGA
	2370	CCUAAAAU	CUGAUGA	X	GAA	AUUCAGG	CCUGGAUUU	AUUUUAGG
	2371	UCCUAAAA	CUGAUGA	X	GAA	AAUUCAG	CUGGAUUUA	UUUUAGGA
	2373	GGUCCUAA	CUGAUGA	X	GAA	AUAAUCC	GGAAUUUUU	UUAGGACC
	2374	UGGUCCUA	CUGAUGA	X	GAA	AAUAAUUC	GAAUUUUUU	UAGGACCA
15	2375	CUGGUCCU	CUGAUGA	X	GAA	AAAUAAUU	AAUUUUUUU	AGGACCAG
	2376	CCUGGUCC	CUGAUGA	X	GAA	AAAUAUU	AUUUUUUUA	GGACCAGG
	2399	UUUCAUA	CUGAUGA	X	GAA	ACAGCGUG	CACGCUGUU	UAUUGAAA
	2400	CUUUCAAU	CUGAUGA	X	GAA	AACAGCGU	ACGCUGUUU	AUUGAAAG
	2401	UCUUUCAA	CUGAUGA	X	GAA	AAACAGCG	CGCUGUUUA	UUGAAAGA
20	2403	ACUCUUUC	CUGAUGA	X	GAA	AUAAACAG	CUGUUUUUU	GAAAGAGU
	2412	UCUUCUGU	CUGAUGA	X	GAA	ACUCUUUC	GAAAGAGUC	ACAGAAGA
	2433	CAGUGAUA	CUGAUGA	X	GAA	ACACCUUC	GAAGGUGUC	UAUCACUG
	2435	UGCAGUGA	CUGAUGA	X	GAA	AGACACCU	AGGUGUCUA	UCACUGCA
	2437	UUUGCAGU	CUGAUGA	X	GAA	AUAGACAC	GUGUCUAUC	ACUGCAAA
25	2465	UUUCCACA	CUGAUGA	X	GAA	AGCCCUUC	GAAGGGCUC	UGUGGAAA
	2476	GUAUGCUG	CUGAUGA	X	GAA	ACUUUCCA	UGGAAAGUU	CAGCAUAC
	2477	GGUAUGC	CUGAUGA	X	GAA	AACUUUCC	GGAAAGUUC	AGCAUACC
	2483	CAGUGAGG	CUGAUGA	X	GAA	AUGCUGAA	UUCAGCAUA	CCUCACUG
	2487	UGAACAGU	CUGAUGA	X	GAA	AGGUAUGC	GCAUACCUC	ACUGUUUA
30	2493	GUUCCUUG	CUGAUGA	X	GAA	ACAGUGAG	CUCACUGUU	CAAGGAAC
	2494	GGUCCUU	CUGAUGA	X	GAA	AACAGUGA	UCACUGUUC	AAGGAACC
	2504	ACUUGUCC	CUGAUGA	X	GAA	AGGUUCCU	AGGAACCUC	GGACAAGU
	2513	CCAGAUUA	CUGAUGA	X	GAA	ACUUGUCC	GGACAAGUC	UAAUCUGG

	2515	CUCCAGAU	CUGAUGA	X	GAA	AGACUUGU	ACAAGUCUA	AUCUGGAG
	2518	CAGCUCCA	CUGAUGA	X	GAA	AUUAGACU	AGUCUAAUC	UGGAGCUG
	2529	GUUAGAGU	CUGAUGA	X	GAA	AUCAGCUC	GAGCUGAUC	ACUCUAAC
	2533	GCAUGUUA	CUGAUGA	X	GAA	AGUGAUC	UGAUCACUC	UAACAUGC
5	2535	GUGCAUGU	CUGAUGA	X	GAA	AGAGUGAU	AUCACUCUA	ACAUGCAC
	2560	CCAGAAGA	CUGAUGA	X	GAA	AGUCGCAG	CUGCGACUC	UCUUCUGG
	2562	AGCCAGAA	CUGAUGA	X	GAA	AGAGUCGC	GCGACUCUC	UUCUGGCU
	2564	GGAGCCAG	CUGAUGA	X	GAA	AGAGAGUC	GACUCUCUU	CUGGCUCC
	2565	AGGAGCCA	CUGAUGA	X	GAA	AAGAGAGU	ACUCUCUUC	UGGCUCUU
10	2571	GUUAAUAG	CUGAUGA	X	GAA	AGCCAGAA	UUCUGGCUC	CUAUUAAC
	2574	AGGGUUA	CUGAUGA	X	GAA	AGGAGCCA	UGGCUCUUA	UUAACCCU
	2576	GGAGGGUU	CUGAUGA	X	GAA	AUAGGAGC	GCUCCUAUU	AACCCUCC
	2577	AGGAGGGU	CUGAUGA	X	GAA	AAUAGGAG	CUCCUAUUA	ACCCUCCU
	2583	CGGAUAAG	CUGAUGA	X	GAA	AGGGUUA	UUAACCCUC	CUUAUCCG
15	2586	UUUCGGAU	CUGAUGA	X	GAA	AGGAGGGU	ACCCUCCUU	AUCCGAAA
	2587	UUUUCGGA	CUGAUGA	X	GAA	AAGGAGGG	CCCUCUUA	UCCGAAAA
	2589	AUUUUUCG	CUGAUGA	X	GAA	AUAAGGAG	CUCCUUAUC	CGAAAAAU
	2606	CAGAAGAA	CUGAUGA	X	GAA	ACCUUUUC	GAAAAGGUC	UUCUUCUG
	2608	UUCAGAAG	CUGAUGA	X	GAA	AGACCUUU	AAAGGUCUU	CUUCUGAA
20	2609	UUUCAGAA	CUGAUGA	X	GAA	AAGACCUU	AAGGUCUUC	UUCUGAAA
	2611	UAUUUCAG	CUGAUGA	X	GAA	AGAAGACC	GGUCUUCUU	CUGAAUA
	2612	UUAUUUCA	CUGAUGA	X	GAA	AAGAAGAC	GUCUUCUUC	UGAAAUAA
	2619	UCAGUCUU	CUGAUGA	X	GAA	AUUUCAGA	UCUGAAUA	AAGACUGA
	2630	UUGAUAGG	CUGAUGA	X	GAA	AGUCAGUC	GACUGACUA	CCUAUCAA
25	2634	AUAAUUGA	CUGAUGA	X	GAA	AGGUAGUC	GACUACCUA	UCAAUUUU
	2636	UUAUAAUU	CUGAUGA	X	GAA	AUAGGUAG	CUACCUAUC	AAUUAUAA
	2640	UCCAUAUU	CUGAUGA	X	GAA	AUUGAUAG	CUAUCAAUU	AUAAUGGA
	2641	GUCCAUA	CUGAUGA	X	GAA	AAUUGAUA	UAUCAAUA	UAAUGGAC
	2643	GGGUCCAU	CUGAUGA	X	GAA	AUAAUUGA	UCAAUAUA	AUGGACCC
30	2661	UCCAAAGG	CUGAUGA	X	GAA	ACUUCAUC	GAUGAAGUU	CCUUUGGA
	2662	AUCCAAAG	CUGAUGA	X	GAA	AACUUCAU	AUGAAGUUC	CUUUGGAU
	2665	CUCAUCCA	CUGAUGA	X	GAA	AGGAACUU	AAGUCCUU	UGGAUGAG
	2666	GCUCAUCC	CUGAUGA	X	GAA	AAGGAACU	AGUCCUUU	GGAUGAGC

2688	UCAUAAGG	CUGAUGA	X	GAA	AGCCGCUC	GAGCGGCUC	CCUUAUGA	
2692	GGCAUCAU	CUGAUGA	X	GAA	AGGGAGCC	GGCUCCTUU	AUGAUGCC	
2693	UGGCAUCA	CUGAUGA	X	GAA	AAGGGAGC	GCUCCTUUA	UGAUGCCA	
2714	CCCGGGCA	CUGAUGA	X	GAA	ACUCCAC	GUGGGAGUU	UGCCCGGG	
5	2715	UCCCCGGC	CUGAUGA	X	GAA	AACUCCCA	UGGGAGUUU	GCCCGGGA
2730	CCCAGUUU	CUGAUGA	X	GAA	AGUCUCUC	GAGAGACUU	AAACUGGG	
2731	GCCCAGUU	CUGAUGA	X	GAA	AAGUCUCU	AGAGACUUA	AACUGGGC	
2744	UUCCAAGU	CUGAUGA	X	GAA	AUUUGCCC	GGGCAAUUC	ACTUUGGAA	
2748	CCUCUUC	CUGAUGA	X	GAA	AGUGAUUU	AAAUACUU	GGAAGAGG	
10	2761	UUUUCCAA	CUGAUGA	X	GAA	AGCCCCUC	GAGGGGCUU	UUGGAAAA
2762	CUUUUCCA	CUGAUGA	X	GAA	AAGCCCCU	AGGGGCUUU	UGGAAAAG	
2763	ACUUUUC	CUGAUGA	X	GAA	AAAGCCCC	GGGGCUUUU	GGAAAAGU	
2775	GAUGCUUG	CUGAUGA	X	GAA	ACCACUUU	AAAGUGGUU	CAAGCAUC	
2776	UGAUGCUU	CUGAUGA	X	GAA	AACCACUU	AAGUGGUUC	AAGCAUCA	
15	2783	CAAUGCU	CUGAUGA	X	GAA	AUGCUUGA	UCAAGCAUC	AGCAUUUG
2789	UAAUGCCA	CUGAUGA	X	GAA	AUGCUGAU	AUCAGCAUU	UGGCAUUA	
2790	UUAUGCC	CUGAUGA	X	GAA	AAUGCUGA	UCAGCAUUU	GGCAUUAA	
2796	GAUUUCU	CUGAUGA	X	GAA	AUGCCAAA	UUUGGCAUU	AAGAAAUC	
2797	UGAUUUCU	CUGAUGA	X	GAA	AAUGCCAA	UUGGCAUUA	AGAAAUCA	
20	2804	ACGUAGGU	CUGAUGA	X	GAA	AUUUCUUA	UAAGAAAUC	ACCUACGU
2809	CCGGCAG	CUGAUGA	X	GAA	AGGUGAUU	AAUCACCUA	CGUGCCGG	
2864	GAGCUUUG	CUGAUGA	X	GAA	ACUCGCUG	CAGCGAGUA	CAAAGCUC	
2872	AGUCAUCA	CUGAUGA	X	GAA	AGCUUUGU	ACAAAGCUC	UGAUGACU	
2886	AAGAUUUU	CUGAUGA	X	GAA	AGCUCAGU	ACUGAGCUA	AAAAUCUU	
25	2892	UGGGUCAA	CUGAUGA	X	GAA	AUUUUUAG	CUAAAAAUC	UUGACCCA
2894	UGUGGGUC	CUGAUGA	X	GAA	AGAUUUU	AAAAAUCUU	GACCCACA	
2904	UGGUGGCC	CUGAUGA	X	GAA	AUGUGGGU	ACCCACAUU	GGCCACCA	
2914	CACGUUCA	CUGAUGA	X	GAA	AUGGUGGC	GCCACCAUC	UGAACGUG	
2925	AGCAGGUU	CUGAUGA	X	GAA	ACCACGUU	AACGUGGUU	AACCUGCU	
30	2926	CAGCAGGU	CUGAUGA	X	GAA	AACCACGU	ACGUGGUUA	ACCUGCUG
2962	CACCAUCA	CUGAUGA	X	GAA	AGGCCUC	GAGGGCCUC	UGAUGGUG	
2973	UAUUCAAC	CUGAUGA	X	GAA	AUCACCAU	AUGGUGAUU	GUUGAAUA	
2976	CAGUAUUC	CUGAUGA	X	GAA	ACAAUCAC	GUGAUUGUU	GAAUACUG	

	2981	AUUUGCAG	CUGAUGA	X	GAA	AUUCAACA	UGUUGAAUA	CUGCAAAU
	2990	GAUUUCCA	CUGAUGA	X	GAA	AUUUGCAG	CUGCAAAUA	UGGAAAU
	2998	GUUGGAGA	CUGAUGA	X	GAA	AUUUCCAU	AUGGAAAU	UCUCCAA
	3000	UAGUUGGA	CUGAUGA	X	GAA	AGAUUCC	GGAAAU	UCCAAUA
5	3002	GGUAGUUG	CUGAUGA	X	GAA	AGAGAUU	AAAU	CAAU
	3008	UCUUGAGG	CUGAUGA	X	GAA	AGUUGGAG	CUCCAUA	CCUAAGA
	3012	UUGCUCUU	CUGAUGA	X	GAA	AGGUAGUU	AACUACC	AAGAGCA
	3029	GAAAAAAU	CUGAUGA	X	GAA	AGUCACGU	ACGUGAC	AUUUUU
	3030	AGAAAAAA	CUGAUGA	X	GAA	AAGUCACG	CGUGACU	UUUUUU
10	3032	UGAGAAAA	CUGAUGA	X	GAA	AUAAGUCA	UGACUUA	UUUUCUA
	3033	UUGAGAAA	CUGAUGA	X	GAA	AAUAAGUC	GACUUA	UUUCUAA
	3034	GUUGAGAA	CUGAUGA	X	GAA	AAUAAGU	ACUUA	UUUCUAA
	3035	UGUUGAGA	CUGAUGA	X	GAA	AAAAUAAG	CUUA	UUUCUAA
	3036	UUGUUGAG	CUGAUGA	X	GAA	AAAAUA	UUUA	UUUCUAA
15	3037	CUUGUUGA	CUGAUGA	X	GAA	AAAAUA	UAUUUU	UCAACAAG
	3039	UCCUUGUU	CUGAUGA	X	GAA	AGAAAAA	UUUUUU	AACAAGGA
	3057	UCCAUGUG	CUGAUGA	X	GAA	AGUGCUGC	GCAGCAC	CACAUGGA
	3070	UUCUUUCU	CUGAUGA	X	GAA	AGGCUCCA	UGGAGCC	AGAAAGAA
	3120	ACGCUAUC	CUGAUGA	X	GAA	AGUCUUGG	CCAAGAC	GAUAGCGU
20	3124	GGUGACGC	CUGAUGA	X	GAA	AUCUAGUC	GACUAGAU	GCGUCACC
	3129	CUGCUGGU	CUGAUGA	X	GAA	ACGCUAUC	GAUAGCG	ACCAGCAG
	3146	AGCUCGCA	CUGAUGA	X	GAA	AGCUUUCG	CGAAAGC	UGCGAGCU
	3147	GAGCUCGC	CUGAUGA	X	GAA	AAGCUUUC	GAAAGCU	GCGAGCUC
	3155	GAAAGCCG	CUGAUGA	X	GAA	AGCUCGCA	UGCGAGC	CGGCUUUC
25	3161	CUUCCUGA	CUGAUGA	X	GAA	AGCCGGAG	CUCCGGC	UCAGGAAG
	3162	UCUUCTUG	CUGAUGA	X	GAA	AAGCCGGA	UCCGGCU	CAGGAAGA
	3163	AUCUCCU	CUGAUGA	X	GAA	AAAGCCGG	CCGGCUU	AGGAAGAU
	3172	CAGACUUU	CUGAUGA	X	GAA	AUCUCCU	AGGAAGAU	AAAGUCUG
	3178	AUCACUCA	CUGAUGA	X	GAA	ACUUUUAU	AUAAAAG	UGAGUGAU
30	3189	UCUCCUC	CUGAUGA	X	GAA	ACAUCACU	AGUGAUG	GAGGAAGA
	3205	ACCGUCAG	CUGAUGA	X	GAA	AUCCUCCU	AGGAGGA	UUGACGGU
	3206	AACCGUCA	CUGAUGA	X	GAA	AAUCCUCC	GGAGGAU	UGACGGU
	3214	CUUGUAGA	CUGAUGA	X	GAA	ACCGUCAG	CUGACGGU	UCUACAAG

	3215	CCUUGUAG	CUGAUGA	X	GAA	AACCGUCA	UGACGGUUU	CUACAAGG
	3216	UCCUUGUA	CUGAUGA	X	GAA	AAACCGUC	GACGGUUUC	UACAAGGA
	3218	GCUCUUG	CUGAUGA	X	GAA	AGAAACCG	CGGUUUCUA	CAAGGAGC
	3231	UCCAUAGU	CUGAUGA	X	GAA	AUGGGCUC	GAGCCCAUC	ACUAUGGA
5	3235	AUCUUCCA	CUGAUGA	X	GAA	AGUGAUGG	CCAUCACUA	UGGAAGAU
	3244	AGAAAUCA	CUGAUGA	X	GAA	AUCUUCCA	UGGAAGAUC	UGAUUUUCU
	3249	CUGUAAGA	CUGAUGA	X	GAA	AUCAGAUC	GAUCUGAUU	UCUACAG
	3250	ACUGUAAG	CUGAUGA	X	GAA	AAUCAGAU	AUCUGAUUU	CUUACAGU
	3251	AACUGUAA	CUGAUGA	X	GAA	AAAUCAGA	UCUGAUUUC	UUACAGUU
10	3253	AAAACUGU	CUGAUGA	X	GAA	AGAAAUCA	UGAUUUUCU	ACAGUUUU
	3254	GAAAACUG	CUGAUGA	X	GAA	AAGAAAU	GAUUUCUUA	CAGUUUUC
	3259	CACUUGAA	CUGAUGA	X	GAA	ACUGUAAG	CUUACAGUU	UUCAAGUG
	3260	CCACUUGA	CUGAUGA	X	GAA	AACUGUAA	UUACAGUUU	UCAAGUGG
	3261	GCCACUUG	CUGAUGA	X	GAA	AAACUGUA	UACAGUUUU	CAAGUGGC
15	3262	GGCCACUU	CUGAUGA	X	GAA	AAAACUGU	ACAGUUUUC	AAGUGGCC
	3284	AAGACAGG	CUGAUGA	X	GAA	ACUCCAUG	CAUGGAGUU	CCUGUCUU
	3285	GAAGACAG	CUGAUGA	X	GAA	AACUCCAU	AUGGAGUUC	CUGUCUUC
	3290	UUCUGGAA	CUGAUGA	X	GAA	ACAGGAAC	GUUCCUGUC	UUCAGAA
	3292	CUUUCUGG	CUGAUGA	X	GAA	AGACAGGA	UCCUGUCUU	CCAGAAAG
20	3293	ACUUUCUG	CUGAUGA	X	GAA	AAGACAGG	CCUGUCUUC	CAGAAAGU
	3306	UCCCGAUG	CUGAUGA	X	GAA	AUGCACUU	AAGUGCAUU	CAUCGGGA
	3307	GUCCCGAU	CUGAUGA	X	GAA	AAUGCACU	AGUGCAUUC	AUCGGGAC
	3310	CAGGUCCC	CUGAUGA	X	GAA	AUGAAUGC	GCAUUCauc	GGGACCUG
	3333	GAUAAAAG	CUGAUGA	X	GAA	AUGUUUCU	AGAAACAUU	CUUUUAUC
25	3334	AGAUAAAA	CUGAUGA	X	GAA	AAUGUUUC	GAAACAUUC	UUUUAUCU
	3336	UCAGAUAA	CUGAUGA	X	GAA	AGAAUGUU	AACAUUCUU	UUUAUCUGA
	3337	CUCAGAU	CUGAUGA	X	GAA	AAGAAUGU	ACAUUCUUU	UAUCUGAG
	3338	UCUCAGAU	CUGAUGA	X	GAA	AAAGAAUG	CAUUCUUUU	AUCUGAGA
	3339	UUCUCAGA	CUGAUGA	X	GAA	AAAAGAAU	AUUCUUUUA	UCUGAGAA
30	3341	UGUUCUCA	CUGAUGA	X	GAA	AUAAAAGA	UCUUUUAUC	UGAGAACA
	3363	AAAUCACA	CUGAUGA	X	GAA	AUCUUCAC	GUGAAGAUU	UGUGAUUU
	3364	AAAAUCAC	CUGAUGA	X	GAA	AAUCUUCA	UGAAGAUUU	GUGAUUUU
	3370	AAGGCCAA	CUGAUGA	X	GAA	AUCACAAA	UUUGUGAUU	UUGGCCUU

	3371	CAAGGCCA	CUGAUGA	X	GAA	AAUCACAA	UUGUGAUUU	UGGCCUUG
	3372	GCAAGGCC	CUGAUGA	X	GAA	AAAUCACA	UGUGAUUUU	GGCCUUGC
	3378	UCCCGGGC	CUGAUGA	X	GAA	AGGCCAAA	UUUGGCCUU	GCCCGGGA
	3388	CUUAUAAA	CUGAUGA	X	GAA	AUCCCGGG	CCCGGGAUA	UUUAUAAG
5	3390	UUCUUUAU	CUGAUGA	X	GAA	AUAUCCCG	CGGGAUAUU	UAUAAGAA
	3391	GUUCUUAU	CUGAUGA	X	GAA	AAUAUCCC	GGGAUAUUU	AUAAGAAC
	3392	GGUUCUUA	CUGAUGA	X	GAA	AAUAUCC	GGAUUUUA	UAAGAACC
	3394	GGGUUCU	CUGAUGA	X	GAA	AUAAUAU	AUAUUUAU	AGAACCCC
	3406	UCUCACAU	CUGAUGA	X	GAA	AUCGGGGU	ACCCCGAUU	AUGUGAGA
10	3407	UUCUCACA	CUGAUGA	X	GAA	AAUCGGGG	CCCCGAUUA	UGUGAGAA
	3424	AAGUCGAG	CUGAUGA	X	GAA	AUCUCCUU	AAGGAGUAU	CUCGACUU
	3427	AGGAAGUC	CUGAUGA	X	GAA	AGUAUCUC	GAGAUACUC	GACUCCU
	3432	UUCAGAGG	CUGAUGA	X	GAA	AGUCGAGU	ACUCGACUU	CCUCUGAA
	3433	UUUCAGAG	CUGAUGA	X	GAA	AAGUCGAG	CUCGACUUC	CUCUGAAA
15	3436	CCAUUUCA	CUGAUGA	X	GAA	AGGAAGUC	GACUCCUC	UGAAAUGG
	3451	AGAUUCGG	CUGAUGA	X	GAA	AGCCAUC	GGAUGGCUC	CCGAAUCU
	3458	CAAAGUA	CUGAUGA	X	GAA	AUUCGGGA	UCCCGAAUC	UAUCUUUG
	3460	GUCAAAGA	CUGAUGA	X	GAA	AGAUUCGG	CCGAAUCUA	UCUUUGAC
	3462	UUGUCAA	CUGAUGA	X	GAA	AUAGAUUC	GAAUCUAUC	UUUGACAA
20	3464	UUUUGUCA	CUGAUGA	X	GAA	AGAUAGAU	AUCUAUCUU	UGACAAAA
	3465	AUUUUGUC	CUGAUGA	X	GAA	AAGAUAGA	UCUAUCUUU	GACAAAAU
	3474	GUGCUGUA	CUGAUGA	X	GAA	AUUUUGUC	GACAAAAUC	UACAGCAC
	3476	UGGUGCUG	CUGAUGA	X	GAA	AGAUUUUG	CAAAAUUA	CAGCACCA
	3500	CUCCGUAA	CUGAUGA	X	GAA	ACCACACG	CGUGUGGUC	UUACGGAG
25	3502	UACUCCGU	CUGAUGA	X	GAA	AGACCACA	UGUGGUCUU	ACGGAGUA
	3503	AUACUCCG	CUGAUGA	X	GAA	AAGACCAC	GUGGUCUUA	CGGAGUAU
	3510	CACAGCAA	CUGAUGA	X	GAA	ACUCCGUA	UACGGAGUA	UUGCUGUG
	3512	CCCACAGC	CUGAUGA	X	GAA	AUACUCCG	CGGAGUAUU	GCUGUGGG
	3525	AAGGAGAA	CUGAUGA	X	GAA	AUUUCCCA	UGGGAAUUC	UUUCUCCU
30	3527	CUAAGGAG	CUGAUGA	X	GAA	AGAUUCC	GGAAAUUU	CUCCUAG
	3528	CCUAAGGA	CUGAUGA	X	GAA	AAGAUUUC	GAAAUUCU	UCCUAGG
	3530	CACCUAAG	CUGAUGA	X	GAA	AGAAGAUU	AAUCUUCUC	CUUAGGUG
	3533	ACCCACCU	CUGAUGA	X	GAA	AGGAGAAG	CUUCUCCUU	AGGUGGGU

	3534	GACCCACC	CUGAUGA	X	GAA	AAGGAGAA	UUCUCCUUA	GGUGGGUC
	3542	GGUAUGGA	CUGAUGA	X	GAA	ACCCACCU	AGGUGGGUC	UCCAUACC
	3544	UGGGUAUG	CUGAUGA	X	GAA	AGACCCAC	GUGGGUCUC	CAUACCCA
	3548	CUCCUGGG	CUGAUGA	X	GAA	AUGGAGAC	GUCUCCAUA	CCCAGGAG
5	3558	UCCAUUUG	CUGAUGA	X	GAA	ACUCCUGG	CCAGGAGUA	CAA AUGGA
	3575	GACUGCAA	CUGAUGA	X	GAA	AGUCCUCA	UGAGGACUU	UUGCAGUC
	3576	CGACUGCA	CUGAUGA	X	GAA	AAGUCCUC	GAGGACUUU	UGCAGUCG
	3577	GCGACUGC	CUGAUGA	X	GAA	AAAGUCCU	AGGACUUUU	GCAGUCGC
	3583	CCUCAGGC	CUGAUGA	X	GAA	ACUGCAAA	UUUGCAGUC	GCCUGAGG
10	3613	GUACUCAG	CUGAUGA	X	GAA	AGCUCUCA	UGAGAGCUC	CUGAGUAC
	3620	GAGUAGAG	CUGAUGA	X	GAA	ACUCAGGA	UCCUGAGUA	CUCUACUC
	3623	CAGGAGUA	CUGAUGA	X	GAA	AGUACUCA	UGAGUACUC	UACUCCUG
	3625	UUCAGGAG	CUGAUGA	X	GAA	AGAGUACU	AGUACTUCU	AUCCUGAA
	3628	GAUUUCAG	CUGAUGA	X	GAA	AGUAGAGU	ACUCUACUC	CUGAAAUC
15	3636	AUCUGAUA	CUGAUGA	X	GAA	AUUUCAGG	CCUGAAAUC	UAUCAGAU
	3638	UGAUCUGA	CUGAUGA	X	GAA	AGAUUUCA	UGAAAUCUA	UCAGAUCA
	3640	CAUGAUCU	CUGAUGA	X	GAA	AUAGAUUU	AAAUCUAUC	AGAUC AUG
	3645	UCCAGCAU	CUGAUGA	X	GAA	AUCUGAUA	UAUCAGAU	AUGCUGGA
	3689	GUUCUGCA	CUGAUGA	X	GAA	AUCUUGGC	GCCAAGAUU	UGCAGAAC
20	3690	AGUUCUGC	CUGAUGA	X	GAA	AAUCUUGG	CCAAGAUUU	GCAGAAUC
	3699	UUUCCAC	CUGAUGA	X	GAA	AGUUCUGC	GCAGAAUCU	GUGGAAAA
	3711	AAAUCACC	CUGAUGA	X	GAA	AGUUUUUC	GAAAAACUA	GGUGAUUU
	3718	UUGAAGCA	CUGAUGA	X	GAA	AUCACCUA	UAGGUGAUU	UGCUUCAA
	3719	CUUGAAGC	CUGAUGA	X	GAA	AAUCACCU	AGGUGAUUU	GCUUCAAG
25	3723	UUUGCUUG	CUGAUGA	X	GAA	AGCAAAUC	GAUUUGCUU	CAAGCAAA
	3724	AUUUGCUU	CUGAUGA	X	GAA	AAGCAAAU	AUUUGCUUC	AAGCAAAU
	3735	UCCUGUUG	CUGAUGA	X	GAA	ACAUUUGC	GCAAAUGUA	CAACAGGA
	3748	GUAGUCUU	CUGAUGA	X	GAA	ACCAUCCU	AGGAUGGUA	AAGACUAC
	3755	UUGGGAUG	CUGAUGA	X	GAA	AGUCUUUA	UAAAGACUA	CAUCCCAA
30	3759	UUGAUUGG	CUGAUGA	X	GAA	AUGUAGUC	GACUACAUC	CCAAUCAA
	3765	AUGGCAUU	CUGAUGA	X	GAA	AUUGGGAU	AUCCCAAUC	AAUGCCAU
	3774	CCUGUCAG	CUGAUGA	X	GAA	AUGGCAUU	AAUGCCAUA	CUGACAGG
	3787	AAACCCAC	CUGAUGA	X	GAA	AUUUCCUG	CAGGAAUA	GUGGGUUU

	3794	AGUAUGUA	CUGAUGA	X	GAA	ACCCACUA	UAGUGGGUU	UACAUACU
	3795	GAGUAUGU	CUGAUGA	X	GAA	AACCCACU	AGUGGGUUU	ACAUACUC
	3796	UGAGUAUG	CUGAUGA	X	GAA	AAACCCAC	GUGGGUUUA	CAUACUCA
	3800	GAGUUGAG	CUGAUGA	X	GAA	AUGUAAAC	GUUUACAU	CUCAACUC
5	3803	CAGGAGUU	CUGAUGA	X	GAA	AGUAUGUA	UACAUACUC	AACUCCUG
	3808	GAAGGCAG	CUGAUGA	X	GAA	AGUUGAGU	ACUCAACUC	CUGCCUUC
	3815	CCUCAGAG	CUGAUGA	X	GAA	AGGCAGGA	UCCUGCCUU	CUCUGAGG
	3816	UCCUCAGA	CUGAUGA	X	GAA	AAGGCAGG	CCUGCCUUC	UCUGAGGA
	3818	AGUCCUCA	CUGAUGA	X	GAA	AGAAGGCA	UGCCUUCUC	UGAGGACU
10	3827	CCUUGAAG	CUGAUGA	X	GAA	AGUCCUCA	UGAGGACUU	CUUCAAGG
	3828	UCCUUGAA	CUGAUGA	X	GAA	AAGUCCUC	GAGGACUUC	UUCAAGGA
	3830	UUUCCUUG	CUGAUGA	X	GAA	AGAAGUCC	GGACUUCUU	CAAGGAAA
	3831	CUUUCUUU	CUGAUGA	X	GAA	AAGAAGUC	GACUUCUUC	AAGGAAAG
	3841	AGCUGAAA	CUGAUGA	X	GAA	ACUUCCU	AGGAAAGUA	UUUCAGCU
15	3843	GGAGCUGA	CUGAUGA	X	GAA	AUACUUUC	GAAAGUAUU	UCAGCUCC
	3844	CGGAGCUG	CUGAUGA	X	GAA	AAUACUUU	AAAGUAUUU	CAGCUCCG
	3845	UCGGAGCU	CUGAUGA	X	GAA	AAUACUU	AAGUAUUUC	AGCUCCGA
	3850	AAACUUCG	CUGAUGA	X	GAA	AGCUGAAA	UUUCAGCUC	CGAAGUUU
	3857	CUGAAUUA	CUGAUGA	X	GAA	ACUUCGGA	UCCGAAGUU	UAAUUCAG
20	3858	CCUGAAUU	CUGAUGA	X	GAA	AACUUCGG	CCGAAGUUU	AAUUCAGG
	3859	UCCUGAAU	CUGAUGA	X	GAA	AAACUUCG	CGAAGUUUA	AUUCAGGA
	3862	GCUUCCUG	CUGAUGA	X	GAA	AUUAAACU	AGUUUAAUU	CAGGAAGC
	3863	AGCUUCCU	CUGAUGA	X	GAA	AAUUAAC	GUUUAAUUC	AGGAAGCU
	3872	CAUCAUCA	CUGAUGA	X	GAA	AGCUUCCU	AGGAAGCUC	UGAUGAUG
25	3882	ACAUAUUCU	CUGAUGA	X	GAA	ACAUCAUC	GAUGAUGUC	AGAUUGU
	3887	CAUUUACA	CUGAUGA	X	GAA	AUCUGACA	UGUCAGUA	UGUAAAUG
	3891	AAAGCAUU	CUGAUGA	X	GAA	ACAUAUUCU	AGAUUGUA	AAUGCUUU
	3898	GAACUUGA	CUGAUGA	X	GAA	AGCAUUUA	UAAAUGCUU	UCAAGUUC
	3899	UGAACUUG	CUGAUGA	X	GAA	AAGCAUUU	AAAUGCUUU	CAAGUUCA
30	3900	AUGAACTU	CUGAUGA	X	GAA	AAAGCAUU	AAUGCUUUC	AAGUUCAU
	3905	GGCUCAUG	CUGAUGA	X	GAA	ACUUGAAA	UUUCAAGUU	CAUGAGCC
	3906	AGGCUCAU	CUGAUGA	X	GAA	AACUUGAA	UUCAAGUUC	AUGAGCCU
	3924	AAGGUUUU	CUGAUGA	X	GAA	AUUCUUUC	GAAAGAAUC	AAAACCUU

	3932	GUUCUUCA	CUGAUGA	X	GAA	AGGUUUUG	CAAAACCUU	UGAAGAAC
	3933	AGUUCUUC	CUGAUGA	X	GAA	AAGGUUUU	AAAACCUUU	GAAGAAACU
	3942	UUCGGUAA	CUGAUGA	X	GAA	AGUUCUUC	GAAGAACUU	UUACCGAA
	3943	AUUCGGUA	CUGAUGA	X	GAA	AAGUUCUU	AAGAACUUU	UACCGAAU
5	3944	CAUUCGGU	CUGAUGA	X	GAA	AAAGUUCU	AGAACUUUU	ACCGAAUG
	3945	GCAUUCGG	CUGAUGA	X	GAA	AAAAGUUC	GAACUUUUA	CCGAAUGC
	3959	CAAACAUG	CUGAUGA	X	GAA	AGGUGGCA	UGCCACCUC	CAUGUUUG
	3965	AGUCAUCA	CUGAUGA	X	GAA	ACAUGGAG	CUCCAUGUU	UGAUGACU
	3966	UAGUCAUC	CUGAUGA	X	GAA	AACAUGGA	UCCAUGUUU	GAUGACTUA
10	3974	CGCCCUGG	CUGAUGA	X	GAA	AGUCAUCA	UGAUGACUA	CCAGGGCG
	3994	GGCCAACA	CUGAUGA	X	GAA	AGUGCUGC	GCAGCACUC	UGUUGGCC
	3998	GAGAGGCC	CUGAUGA	X	GAA	ACAGAGUG	CACUCUGUU	GGCCUCUC
	4004	GCAUGGGA	CUGAUGA	X	GAA	AGGCCAAC	GUUGGCCUC	UCCCAUGC
	4006	CAGCAUGG	CUGAUGA	X	GAA	AGAGGCCA	UGGCCUCUC	CCAUGCUG
15	4022	UCCAGGUG	CUGAUGA	X	GAA	AGCGCUUC	GAAGCGCUU	CACCUGGA
	4023	GUCCAGGU	CUGAUGA	X	GAA	AAGCGCUU	AAGCGCUUC	ACCUGGAC
	4052	UCUUGAGC	CUGAUGA	X	GAA	AGGCCUUG	CAAGGCCUC	GCUCAAGA
	4056	UCAAUCUU	CUGAUGA	X	GAA	AGCGAGGC	GCCUCGCUC	AAGAUUGA
	4062	CUCAAGUC	CUGAUGA	X	GAA	AUCUUGAG	CUCAAGAUU	GACUUGAG
20	4067	UUACUCUC	CUGAUGA	X	GAA	AGUCAAUC	GAUUGACUU	GAGAGUAA
	4074	UUACUGGU	CUGAUGA	X	GAA	ACUCUCAA	UUGAGAGUA	ACCAGUAA
	4081	CUUACUUU	CUGAUGA	X	GAA	ACUGGUUA	UAACCAGUA	AAAGUAAG
	4087	CGACUCCU	CUGAUGA	X	GAA	ACUUUUAC	GUAAAAGUA	AGGAGUCG
	4094	ACAGCCCC	CUGAUGA	X	GAA	ACUCCUUA	UAAGGAGUC	GGGGCUGU
25	4103	UGACAUCA	CUGAUGA	X	GAA	ACAGCCCC	GGGGCUGUC	UGAUGUCA
	4110	GGCCUGCU	CUGAUGA	X	GAA	ACAUCAGA	UCUGAUGUC	AGCAGGCC
	4123	AUGGCAGA	CUGAUGA	X	GAA	ACUGGGCC	GGCCCAGUU	UCUGCCAU
	4124	AAUGGCAG	CUGAUGA	X	GAA	AACUGGGC	GCCCAGUUU	CUGCCAUU
	4125	GAAUGGCA	CUGAUGA	X	GAA	AAACUGGG	CCCAGUUUC	UGCCAUIUC
30	4132	ACAGCUGG	CUGAUGA	X	GAA	AUGGCAGA	UCUGCCAUU	CCAGCUGU
	4133	CACAGCUG	CUGAUGA	X	GAA	AAUGGCAG	CUGCCAUUC	CAGCUGUG
	4149	CCUUCGCU	CUGAUGA	X	GAA	ACGUGCCC	GGGCACGUC	AGCGAAGG
	4169	CGUAGGUG	CUGAUGA	X	GAA	ACCUGCGC	GCGCAGGUU	CACCUACG

	4170	UCGUAGGU	CUGAUGA	X	GAA	AACCUGCG	CGCAGGUUC	ACCUACGA
	4175	CGUGGUCG	CUGAUGA	X	GAA	AGGUGAAC	GUUCACCUA	CGACCACG
	4203	CAGCACGC	CUGAUGA	X	GAA	AUUUUCU	AGGAAAUC	GCGUGCUG
	4214	GGGGCGGG	CUGAUGA	X	GAA	AGCAGCAC	GUGCUGCUC	CCCCCCCC
5	4229	CCGAGUUG	CUGAUGA	X	GAA	AGUCUGGG	CCCAGACUA	CAACUCGG
	4235	GGACCACC	CUGAUGA	X	GAA	AGUUGUAG	CUACAACUC	GGUGGUCC
	4242	GAGUACAG	CUGAUGA	X	GAA	ACCACCGA	UCGGUGGUC	CUGUACUC
	4247	GGGUGGAG	CUGAUGA	X	GAA	ACAGGACC	GGUCCUGUA	CUCCACCC
	4250	GUGGGGUG	CUGAUGA	X	GAA	AGUACAGG	CCUGUACUC	CACCCAC
10	4263	AAACUCUA	CUGAUGA	X	GAA	AUGGGUGG	CCACCCAUC	UAGAGUUU
	4265	UCAAACUC	CUGAUGA	X	GAA	AGAUGGGU	ACCCAUCUA	GAGUUUGA
	4270	UCGUGUCA	CUGAUGA	X	GAA	ACUCUAGA	UCUAGAGUU	UGACACGA
	4271	UUCGUGUC	CUGAUGA	X	GAA	AACUCUAG	CUAGAGUUU	GACACGAA
	4284	CUAGAAAU	CUGAUGA	X	GAA	AGGCUUCG	CGAAGCCUU	AUUUCUAG
15	4285	UCUAGAAA	CUGAUGA	X	GAA	AAGGCUUC	GAAGCCUUA	UUUCUAGA
	4287	CUUCUAGA	CUGAUGA	X	GAA	AUAAGGCU	AGCCUUAUU	UCUAGAAG
	4288	GCUUCUAG	CUGAUGA	X	GAA	AAUAAGGC	GCCUUAUUU	CUAGAAGC
	4289	UGCUCUA	CUGAUGA	X	GAA	AAAUAAGG	CCUUAUUUC	UAGAAGCA
	4291	UGUGCUUC	CUGAUGA	X	GAA	AGAAUAA	UUUUUUCUA	GAAGCACA
20	4305	GGUAUAAA	CUGAUGA	X	GAA	ACACAUGU	ACAUGUGUA	UUUAUACC
	4307	GGGGUUAU	CUGAUGA	X	GAA	AUACACAU	AUGUGUAUU	UAUACCCC
	4308	GGGGGUUAU	CUGAUGA	X	GAA	AAUACACA	UGUGUAUUU	AUACCCCC
	4309	UGGGGGUA	CUGAUGA	X	GAA	AAAUACAC	GUGUAUUUA	UACCCCCA
	4311	CCUGGGGG	CUGAUGA	X	GAA	AUAAAUAC	GUAUUUAUA	CCCCCAGG
25	4325	GCAAAAGC	CUGAUGA	X	GAA	AGUUUCCU	AGGAAACUA	GCUUUUGC
	4329	ACUGGCAA	CUGAUGA	X	GAA	AGCUAGUU	AACUAGCUU	UUGCCAGU
	4330	UACUGGCA	CUGAUGA	X	GAA	AAGCUAGU	ACUAGCUUU	UGCCAGUA
	4331	AUACUGGC	CUGAUGA	X	GAA	AAAGCUAG	CUAGCUUUU	GCCAGUAU
	4338	AUGCAUAA	CUGAUGA	X	GAA	ACUGGCAA	UUGCCAGUA	UUUUGCAU
30	4340	AUAUGCAU	CUGAUGA	X	GAA	AUACUGGC	GCCAGUAUU	AUGCAUUA
	4341	UAUAUGCA	CUGAUGA	X	GAA	AAUACUGG	CCAGUAUUA	UGCAUUAU
	4347	AACUUAUA	CUGAUGA	X	GAA	AUGCAUAA	UUUUGCAUA	UAUAAGUU
	4349	UAAACUUA	CUGAUGA	X	GAA	AUAUGCAU	AUGCAUUA	UAAGUUUA

	4351	UGUAAACU	CUGAUGA	X	GAA	AUAUAUGC	GCAUAUAUA	AGUUUACA
	4355	AAGGUGUA	CUGAUGA	X	GAA	ACUUUAU	AUAUAAGUU	UACACCUU
	4356	AAAGGUGU	CUGAUGA	X	GAA	AACUUAUA	UAUAAGUUU	ACACCUUU
	4357	UAAAGGUG	CUGAUGA	X	GAA	AAACUUAU	AUAAGUUUA	CACCUUUA
5	4363	GAAAGAU	CUGAUGA	X	GAA	AGGUGUAA	UUACACCUU	UAUCUUUC
	4364	GGAAAGAU	CUGAUGA	X	GAA	AAGGUGUA	UACACCUUU	AUCUUUCC
	4365	UGGAAAGA	CUGAUGA	X	GAA	AAAGGUGU	ACACCUUUA	UCUUUCCA
	4367	CAUGGAAA	CUGAUGA	X	GAA	AUAAAGGU	ACCUUUAUC	UUUCCAUG
	4369	CCCAUGGA	CUGAUGA	X	GAA	AGAUAAAG	CUUUAUCUU	UCCAUGGG
10	4370	UCCCAUGG	CUGAUGA	X	GAA	AAGAUAAA	UUUAUCUUU	CCAUGGGA
	4371	CUCCCAUG	CUGAUGA	X	GAA	AAAGAUAA	UUUAUCUUU	CAUGGGAG
	4389	AUCACAAA	CUGAUGA	X	GAA	AGCAGCUG	CAGCUGCUU	UUUGUGAU
	4390	AAUCACAA	CUGAUGA	X	GAA	AAGCAGCU	AGCUGCUUU	UUGUGAUU
	4391	AAAUCACA	CUGAUGA	X	GAA	AAAGCAGC	GCUGCUUUU	UGUGAUUU
15	4392	AAAAUCAC	CUGAUGA	X	GAA	AAAAGCAG	CUGCUUUUU	GUGAUUUU
	4398	AUUAAAAA	CUGAUGA	X	GAA	AUCACAAA	UUUGUGAUU	UUUUUAAU
	4399	UAUUAAAA	CUGAUGA	X	GAA	AAUCACAA	UUGUGAUUU	UUUUAAUA
	4400	CUAUUAAA	CUGAUGA	X	GAA	AAAUCACA	UGUGAUUUU	UUUAAUAG
	4401	ACUAUUAA	CUGAUGA	X	GAA	AAAAUCAC	GUGAUUUUU	UUAAUAGU
20	4402	CACUAUUA	CUGAUGA	X	GAA	AAAAAUCA	UGAUUUUUU	UAAUAGUG
	4403	GCACUAUU	CUGAUGA	X	GAA	AAAAAAUC	GAUUUUUUU	AAUAGUGC
	4404	AGCACUAU	CUGAUGA	X	GAA	AAAAAAAU	AUUUUUUUA	AUAGUGCU
	4407	AAAAGCAC	CUGAUGA	X	GAA	AUUAAAAA	UUUUUAAUA	GUGCUUUU
	4413	AAAAAATA	CUGAUGA	X	GAA	AGCACUAU	AUAGUGCUU	UUUUUUUU
25	4414	AAAAAATA	CUGAUGA	X	GAA	AAGCACUA	UAGUGCUUU	UUUUUUUU
	4415	CAAAAAAA	CUGAUGA	X	GAA	AAAGCACU	AGUGCUUUU	UUUUUUUG
	4416	UCAAAAAA	CUGAUGA	X	GAA	AAAAGCAC	GUGCUUUUU	UUUUUUGA
	4417	GUCAAAAA	CUGAUGA	X	GAA	AAAAAGCA	UGCUUUUUU	UUUUUGAC
	4418	AGUCAAAA	CUGAUGA	X	GAA	AAAAAAGC	GCUUUUUUU	UUUUUGACU
30	4419	UAGUCAAA	CUGAUGA	X	GAA	AAAAAAG	CUUUUUUUU	UUUGACUA
	4420	UUAGUCAA	CUGAUGA	X	GAA	AAAAAATA	UUUUUUUUU	UUGACUAA
	4421	GUUAGUCA	CUGAUGA	X	GAA	AAAAAATA	UUUUUUUUU	UGACUAAC
	4422	UGUUAGUC	CUGAUGA	X	GAA	AAAAAATA	UUUUUUUUU	GACUAACA

	4427	AUUCUUGU	CUGAUGA	X	GAA	AGUCAAAA	UUUUGACUA	ACAAGAAU
	4438	UCUGGAGU	CUGAUGA	X	GAA	ACAUUCUU	AAGAAUGUA	ACUCCAGA
	4442	UCUAUCUG	CUGAUGA	X	GAA	AGUUACAU	AUGUAACUC	CAGAUAGA
	4448	UAUUUCUC	CUGAUGA	X	GAA	AUCUGGAG	CUCCAGAU	GAGAAUA
5	4456	CUUGUCAC	CUGAUGA	X	GAA	AUUUCUCU	AGAGAAAUA	GUGACAAG
	4476	UUUAGCAG	CUGAUGA	X	GAA	AGUGUUCU	AGAACACUA	CUGCUAAA
	4482	UGAGGAUU	CUGAUGA	X	GAA	AGCAGUAG	CUACUGCUA	AAUCCUCA
	4486	AACAUGAG	CUGAUGA	X	GAA	AUUUAGCA	UGCUIAAAUC	CUCAUGUU
	4489	AGUAACAU	CUGAUGA	X	GAA	AGGAUUUA	UAAAUCCUC	AUGUUACU
10	4494	CACUGAGU	CUGAUGA	X	GAA	ACAUGAGG	CCUCAUGUU	ACUCAGUG
	4495	ACACUGAG	CUGAUGA	X	GAA	AACAUGAG	CUCAUGUUA	CUCAGUGU
	4498	CUAACACU	CUGAUGA	X	GAA	AGUAACAU	AUGUUACUC	AGUGUUAG
	4504	AUUUCUCU	CUGAUGA	X	GAA	ACACUGAG	CUCAGUGUU	AGAGAAAU
	4505	GAUUUCUC	CUGAUGA	X	GAA	AACACUGA	UCAGUGUUA	GAGAAUUC
15	4513	UUAGGAAG	CUGAUGA	X	GAA	AUUUCUCU	AGAGAAAUC	CUUCCUAA
	4516	GGUUUAGG	CUGAUGA	X	GAA	AGGAUUUC	GAAAUCCUU	CCUAAACC
	4517	GGGUUUAG	CUGAUGA	X	GAA	AAGGAUUU	AAAUCCUUC	CUAAACCC
	4520	AUUGGGUU	CUGAUGA	X	GAA	AGGAAGGA	UCCUCCUA	AACCCAAU
	4533	GAGCAGGG	CUGAUGA	X	GAA	AGUCAUUG	CAAUGACUU	CCCUGCUC
20	4534	GGAGCAGG	CUGAUGA	X	GAA	AAGUCAUU	AAUGACUUC	CCUGCUC
	4541	GGGGGUUG	CUGAUGA	X	GAA	AGCAGGGA	UCCCUGCUC	CAACCCCC
	4557	CGUGCCCU	CUGAUGA	X	GAA	AGGUGGCG	CGCCACCUC	AGGGCAGC
	4576	CUCAAUCA	CUGAUGA	X	GAA	ACUGGUCC	GGACCAGUU	UGAUUGAG
	4577	CCUCAAUC	CUGAUGA	X	GAA	AACUGGUC	GACCAGUUU	GAUUGAGG
25	4581	AGCUCCUC	CUGAUGA	X	GAA	AUCAAACU	AGUUUGAUU	GAGGAGCU
	4598	CAUUGGGU	CUGAUGA	X	GAA	AUCAGUGC	GCACUGAUC	ACCCAAUG
	4610	GGGUACGU	CUGAUGA	X	GAA	AUGCAUUG	CAAUGCAUC	ACGUACCC
	4615	CAGUGGGG	CUGAUGA	X	GAA	ACGUGAUG	CAUCACGUA	CCCCACUG
	4664	CUGGGGCU	CUGAUGA	X	GAA	ACGGGCUU	AAGCCCGUU	AGCCCCAG
30	4665	CCUGGGGC	CUGAUGA	X	GAA	AACGGGCU	AGCCCGUUA	GCCCCAGG
	4678	CAGCCAGU	CUGAUGA	X	GAA	AUCCCCUG	CAGGGGAUC	ACUGGCUG
	4700	ACUCCCGA	CUGAUGA	X	GAA	AUGUUGCU	AGCAACAUC	UCGGGAGU
	4702	GGACUCCC	CUGAUGA	X	GAA	AGAUGUUG	CAACAUCUC	GGGAGUCC

70

	4709	UGCUGAGAG	CUGAUGA	X	GAA	ACUCCCGA	UCGGGAGUC	CUCUAGCA
	4712	GCCUGCUA	CUGAUGA	X	GAA	AGGACUCC	GGAGUCCUC	UAGCAGGC
	4714	AGGCCUGC	CUGAUGA	X	GAA	AGAGGACU	AGUCCUCUA	GCAGGCCU
	4723	ACAUGUCU	CUGAUGA	X	GAA	AGGCCUGC	GCAGGCCUA	AGACAUGU
5	4802	GCGUCUCA	CUGAUGA	X	GAA	AUUCUUUC	GAAAGAAUU	UGAGACGC
	4803	UGCGUCUC	CUGAUGA	X	GAA	AAUUCUUU	AAAGAAUUU	GAGACGCA
	4840	GCAUUGCU	CUGAUGA	X	GAA	AGCCCCGU	ACGGGGCUC	AGCAAUGC
	4852	GCCACUGA	CUGAUGA	X	GAA	AUGGCAUU	AAUGCCAUU	UCAGUGGC
	4853	AGCCACUG	CUGAUGA	X	GAA	AAUGGCAU	AUGCCAUUU	CAGUGGCU
10	4854	AAGCCACU	CUGAUGA	X	GAA	AAAUGGCA	UGCCAUUUC	AGUGGCUU
	4862	GAGCUGGG	CUGAUGA	X	GAA	AGCCACUG	CAGUGGCUU	CCCAGCUC
	4863	AGAGCUGG	CUGAUGA	X	GAA	AAGCCACU	AGUGGCUUC	CCAGCUCU
	4870	AAGGGUCA	CUGAUGA	X	GAA	AGCUGGGA	UCCCAGCUC	UGACCCUU
	4878	AAAUGUAG	CUGAUGA	X	GAA	AGGGUCAG	CUGACCCUU	CUACAUUU
15	4879	CAA AUGUA	CUGAUGA	X	GAA	AAGGGUCA	UGACCCUUC	UACAUUUG
	4881	CUCAA AUG	CUGAUGA	X	GAA	AGAAGGGU	ACCCUUCUA	CAUUUGAG
	4885	GGCCCUCA	CUGAUGA	X	GAA	AUGUAGAA	UUCUACAUU	UGAGGGCC
	4886	GGGCCCUC	CUGAUGA	X	GAA	AAUGUAGA	UCUACAUUU	GAGGGCCC
	4929	AUCCAGAA	CUGAUGA	X	GAA	AUGUCCCC	GGGGACAUU	UUCUGGAU
20	4930	AAUCCAGA	CUGAUGA	X	GAA	AAUGUCCC	GGGACAUUU	UCUGGAUU
	4931	GAAUCCAG	CUGAUGA	X	GAA	AAAUGUCC	GGACAUUUU	CUGGAUUC
	4932	AGAAUCCA	CUGAUGA	X	GAA	AAAUGUC	GACAUUUUC	UGGAUUCU
	4938	CCUCCCAG	CUGAUGA	X	GAA	AUCCAGAA	UUCUGGAUU	CUGGGAGG
	4939	GCCUCCCA	CUGAUGA	X	GAA	AAUCCAGA	UCUGGAUUC	UGGGAGGC
25	4963	AAAAAAGA	CUGAUGA	X	GAA	AUUUGUCC	GGACAAAUA	UCUUUUUU
	4965	CCAAAAAA	CUGAUGA	X	GAA	AUAUUUGU	ACAAAUAUC	UUUUUUGG
	4967	UUCCAAAA	CUGAUGA	X	GAA	AGAUUUUU	AAAUAUUUU	UUUUGGAA
	4968	GUUCCAAA	CUGAUGA	X	GAA	AAGAUUUU	AAUAUCUUU	UUUGGAAC
	4969	AGUCCCAA	CUGAUGA	X	GAA	AAAGAUUU	AUAUCUUUU	UUGGAACU
30	4970	UAGUCCA	CUGAUGA	X	GAA	AAAAGAUU	UAUCUUUUU	UGGAACUA
	4971	UUAGUCC	CUGAUGA	X	GAA	AAAAAGAU	AUCUUUUUU	GGAACUAA
	4978	AUUUGCUU	CUGAUGA	X	GAA	AGUCCCAA	UUGGAACUA	AAGCAAAU
	4987	AGGUCUAA	CUGAUGA	X	GAA	AUUUGCUU	AAGCAAAUU	UUAGACCU

	4988	AAGGUCUA	CUGAUGA	X	GAA	AAUUUGCU	AGCAAUUU	UAGACCUU
	4989	AAAGGUCU	CUGAUGA	X	GAA	AAAUUUGC	GCAAUUUU	AGACCUUU
	4990	UAAAGGUC	CUGAUGA	X	GAA	AAAAUUUG	CAAAUUUU	GACCUUUA
	4996	CAUAGGUA	CUGAUGA	X	GAA	AGGUCUAA	UUAGACCUU	UACCUAUG
5	4997	CCAUAGGU	CUGAUGA	X	GAA	AAGGUCUA	UAGACCUUU	ACCUAUGG
	4998	UCCAUAGG	CUGAUGA	X	GAA	AAAGGUCU	AGACCUUUA	CCUAUGGA
	5002	CACUUCCA	CUGAUGA	X	GAA	AGGUAAAAG	CUUUACCUA	UGGAAGUG
	5013	GGACAUAG	CUGAUGA	X	GAA	ACCACUUC	GAAGUGGUU	CUAUGUCC
	5014	UGGACAUU	CUGAUGA	X	GAA	AACCACUU	AAGUGGUUC	UAUGUCCA
10	5016	AAUGGACA	CUGAUGA	X	GAA	AGAACCAC	GUGGUUCUA	UGUCCAUU
	5020	UGAGAAUG	CUGAUGA	X	GAA	ACAUAGAA	UUCUAUGUC	CAUUCUCA
	5024	CGAAUGAG	CUGAUGA	X	GAA	AUGGACAU	AUGUCCAUU	CUCAUUCG
	5025	ACGAAUGA	CUGAUGA	X	GAA	AAUGGACA	UGUCCAUUC	UCAUUCGU
	5027	CCACGAU	CUGAUGA	X	GAA	AGAAUGGA	UCCAUUCUC	AUUCGUGG
15	5030	AUGCCACG	CUGAUGA	X	GAA	AUGAGAAU	AUUCUCAU	CGUGGCAU
	5031	CAUGCCAC	CUGAUGA	X	GAA	AAUGAGAA	UUCUCAUUC	GUGGCAUG
	5041	CAAAUCAA	CUGAUGA	X	GAA	ACAUGCCA	UGGCAUGUU	UUGAUUUG
	5042	ACAAAUCA	CUGAUGA	X	GAA	AACAUGCC	GGCAUGUUU	UGAUUUUG
	5043	UACAAUUC	CUGAUGA	X	GAA	AAACAUGC	GCAUGUUUU	GAUUUGUA
20	5047	GUGCUACA	CUGAUGA	X	GAA	AUCAAAC	GUUUUGAUU	UGUAGCAC
	5048	AGUGCUAC	CUGAUGA	X	GAA	AAUCAAAA	UUUUGAUUU	GUAGCACU
	5051	CUCAGUGC	CUGAUGA	X	GAA	ACAAAUCA	UGAUUUUGA	GCACUGAG
	5069	UCAGAGUU	CUGAUGA	X	GAA	AGUGCCAC	GUGGCACUC	AACUCUGA
	5074	UGGGCUCA	CUGAUGA	X	GAA	AGUUGAGU	ACUCAACUC	UGAGCCCA
25	5084	GCCAAAAG	CUGAUGA	X	GAA	AUGGGCUC	GAGCCCAUA	CUUUUGGC
	5087	GGAGCCAA	CUGAUGA	X	GAA	AGUAUGGG	CCCAUACUU	UUGGCUCC
	5088	AGGAGCCA	CUGAUGA	X	GAA	AAGUAUGG	CCAUACUUU	UGGCUCUU
	5089	GAGGAGCC	CUGAUGA	X	GAA	AAAGUAUG	CAUACUUUU	GGCUCCUC
	5094	UACUAGAG	CUGAUGA	X	GAA	AGCCAAAA	UUUUGGCUC	CUCUAGUA
30	5097	UCUUAUA	CUGAUGA	X	GAA	AGGAGCCA	UGGCUCUCC	UAGUAAGA
	5099	CAUCUUA	CUGAUGA	X	GAA	AGAGGAGC	GCUCUCCUA	GUAAGAUG
	5102	GUGCAUCU	CUGAUGA	X	GAA	ACUAGAGG	CCUCUAGUA	AGAUGCAC
	5119	CUCUGGCU	CUGAUGA	X	GAA	AGUUUUA	UGAAAACUU	AGCCAGAG

5120	ACUCUGGC	CUGAUGA	X	GAA	AAGUUUUC	GAAAACUUA	GCCAGAGU	
5129	GACAACCU	CUGAUGA	X	GAA	ACUCUGGC	GCCAGAGUU	AGGUUGUC	
5130	AGACAACC	CUGAUGA	X	GAA	AACUCUGG	CCAGAGUUA	GGUUGUCU	
5134	CUGGAGAC	CUGAUGA	X	GAA	ACCUAACU	AGUUAGGUU	GUCUCCAG	
5	5137	GGCCUGGA	CUGAUGA	X	GAA	ACAACCUA	UAGGUUGUC	UCCAGGCC
5139	AUGGCCUG	CUGAUGA	X	GAA	AGACAACC	GGUUGUCUC	CAGGCCAU	
5156	UUCAGUGU	CUGAUGA	X	GAA	AGGCCAUC	GAUGGCCUU	ACACUGAA	
5157	UUUCAGUG	CUGAUGA	X	GAA	AAGGCCAU	AUGGCCUUA	CACUGAAA	
5170	UAGAAUGU	CUGAUGA	X	GAA	ACAUUUUC	GAAAUGUC	ACAUUCUA	
10	5175	CAAAAUAG	CUGAUGA	X	GAA	AUGUGACA	UGUCACAUU	CUAUUUUG
5176	CCAAAUA	CUGAUGA	X	GAA	AAUGUGAC	GUCACAUUC	UAUUUUGG	
5178	ACCCAAA	CUGAUGA	X	GAA	AGAAUGUG	CACAUUCUA	UUUUGGGU	
5180	AUACCCAA	CUGAUGA	X	GAA	AUAGAAUG	CAUUCUAUU	UUGGGUUAU	
5181	AAUACCCA	CUGAUGA	X	GAA	AAUAGAAU	AUUCUAUUU	UGGGUAUU	
15	5182	UAAUACCC	CUGAUGA	X	GAA	AAAUAGAA	UUCUAUUUU	GGGUAAUA
5187	UAUAUUA	CUGAUGA	X	GAA	ACCCAAA	UUUUGGGUA	UUAUAUA	
5189	UAUAUAU	CUGAUGA	X	GAA	AUACCCAA	UUGGGUAUU	AAUAUAUA	
5190	CUAUUAU	CUGAUGA	X	GAA	AAUACCCA	UGGGUAUUA	AUAUAUAG	
5193	GGACUUA	CUGAUGA	X	GAA	AUUAUAC	GUUAUAUA	UAUAGUCC	
20	5195	CUGGACUA	CUGAUGA	X	GAA	AUAUAAU	AUUAUAUA	UAGUCCAG
5197	GUCUGGAC	CUGAUGA	X	GAA	AUAUAUA	UAAUAUAUA	GUCCAGAC	
5200	AGUGUCUG	CUGAUGA	X	GAA	ACUAUAUA	UAUAUAGUC	CAGACACU	
5209	AUUGAGUU	CUGAUGA	X	GAA	AGUGUCUG	CAGACACUU	AACUCAAU	
5210	AAUUGAGU	CUGAUGA	X	GAA	AAGUGUCU	AGACACUUA	ACUCAAUU	
25	5214	AAGAAAUU	CUGAUGA	X	GAA	AGUUAAGU	ACUUAACUC	AAUUUCUU
5218	UACCAAGA	CUGAUGA	X	GAA	AUUGAGUU	AACUCAAUU	UCUUGGUA	
5219	AUACCAAG	CUGAUGA	X	GAA	AAUUGAGU	ACUCAAUUU	CUUGGUUAU	
5220	AAUACCAA	CUGAUGA	X	GAA	AAUUGAG	CUCAAUUUC	UUGGUUAUU	
5222	AUAAUACC	CUGAUGA	X	GAA	AGAAAUUG	CAAUUUCUU	GGUAUUUAU	
30	5226	CAGAAUAA	CUGAUGA	X	GAA	ACCAAGAA	UUCUUGGUA	UUAUUCUG
5228	AACAGAAU	CUGAUGA	X	GAA	AUACCAAG	CUUGGUUAU	AUUCUGUU	
5229	AAACAGAA	CUGAUGA	X	GAA	AAUACCAA	UUGGUUAUA	UUCUGUUU	
5231	CAAAACAG	CUGAUGA	X	GAA	AUAAUACC	GGUAUUUAU	CUGUUUUG	

	5232	GCAAAACA	CUGAUGA	X	GAA	AAUAAUAC	GUAUUUUC	UGUUUUGC
	5236	CUGUGCAA	CUGAUGA	X	GAA	ACAGAAUA	UAUUCUGUU	UUGCACAG
	5237	ACUGUGCA	CUGAUGA	X	GAA	AACAGAAU	AUUCUGUUU	UGCACAGU
	5238	AACUGUGC	CUGAUGA	X	GAA	AAACAGAA	UUCUGUUUU	GCACAGUU
5	5246	UCACAACU	CUGAUGA	X	GAA	ACUGUGCA	UGCACAGUU	AGUUGUGA
	5247	UUCACAAC	CUGAUGA	X	GAA	AACUGUGC	GCACAGUUA	GUUGUGAA
	5250	UCUUUCAC	CUGAUGA	X	GAA	ACUAAUCG	CAGUUAGUU	GUGAAAGA
	5284	CUCCUCAG	CUGAUGA	X	GAA	ACUGCAUU	AAUGCAGUC	CUGAGGAG
	5296	AUGGAGAA	CUGAUGA	X	GAA	ACUCUCCU	AGGAGAGUU	UUCUCCAU
10	5297	UAUGGAGA	CUGAUGA	X	GAA	AACUCUCC	GGAGAGUUU	UCUCCAUA
	5298	AUAUGGAG	CUGAUGA	X	GAA	AAACUCUC	GAGAGUUUU	CUCCAUAU
	5299	GAUAUGGA	CUGAUGA	X	GAA	AAAACUCU	AGAGUUUUC	UCCAUAUC
	5301	UUGAU AUG	CUGAUGA	X	GAA	AGAAAACU	AGUUUUCUC	CAUAUCAA
	5305	CGUUUUGA	CUGAUGA	X	GAA	AUGGAGAA	UUCUCCAUA	UCAAACG
15	5307	CUCGUUUU	CUGAUGA	X	GAA	AUAUGGAG	CUCCAUAUC	AAAACGAG
	5336	ACCUUAUU	CUGAUGA	X	GAA	ACCUUUUU	AAAAAGGUC	AAUAAGGU
	5340	CUUGACCU	CUGAUGA	X	GAA	AUUGACCU	AGGUCAAUA	AGGUCAAG
	5345	CUUCCCUU	CUGAUGA	X	GAA	ACCUUAUU	AAUAAGGUC	AAGGGAAG
	5361	GGUAUAGA	CUGAUGA	X	GAA	ACGGGGUC	GACCCCGUC	UCUAUACC
20	5363	UUGGUUAUA	CUGAUGA	X	GAA	AGACGGGG	CCCCGUCUC	UAUACCAA
	5365	GGUUGGUA	CUGAUGA	X	GAA	AGAGACGG	CCGUCUCUA	UACCAACC
	5367	UUGGUUGG	CUGAUGA	X	GAA	AUAGAGAC	GUCUCUAUA	CCAACCAA
	5382	UGUUGGUG	CUGAUGA	X	GAA	AUUGGUUU	AAACCAAUU	CACCAACA
	5383	GUGUUGGU	CUGAUGA	X	GAA	AAUUGGUU	AACCAAUUC	ACCAACAC
25	5395	UGGUUCCC	CUGAUGA	X	GAA	ACUGUGUU	AACACAGUU	GGGACCCA
	5417	ACGUGACU	CUGAUGA	X	GAA	ACUUCCUG	CAGGAAGUC	AGUCACGU
	5421	GGAAACGU	CUGAUGA	X	GAA	ACUGACUU	AAGUCAGUC	ACGUUJCC
	5426	GAAAAGGA	CUGAUGA	X	GAA	ACGUGACU	AGUCACGUU	UCCUUUUC
	5427	UGAAAAGG	CUGAUGA	X	GAA	AACGUGAC	GUCACGUUU	CCUUUUAU
30	5428	AUGAAAAG	CUGAUGA	X	GAA	AAACGUGA	UCACGUUUC	CUUUUCAU
	5431	UAAAUGAA	CUGAUGA	X	GAA	AGGAAACG	CGUUUCCUU	UUAUUUA
	5432	UUAAAUGA	CUGAUGA	X	GAA	AAGGAAAC	GUUUCCUUU	UCAUUJAA
	5433	AUUAAAUG	CUGAUGA	X	GAA	AAAGGAAA	UUUCCUUUU	CAUUUAAU

	5434	CAUUAUU	CUGAUGA	X	GAA	AAAAGGAA	UUCUUUUUC	AUUUAAUG
	5437	CCCCAUUA	CUGAUGA	X	GAA	AUGAAAAG	CUUUUCAUU	UAAUGGGG
	5438	UCCCCAUU	CUGAUGA	X	GAA	AAUGAAAA	UUUUCAUUU	AAUGGGGA
	5439	AUCCCCAU	CUGAUGA	X	GAA	AAAUGAAA	UUUCAUUUA	AUGGGGAU
5	5448	GAUAGUGG	CUGAUGA	X	GAA	AUCCCCAU	AUGGGGAU	CCACUAUC
	5449	AGAUAGUG	CUGAUGA	X	GAA	AAUCCCCA	UGGGGAUUC	CACUAUCU
	5454	GUGUGAGA	CUGAUGA	X	GAA	AGUGGAAU	AUUCACUA	UCUCACAC
	5456	UAGUGUGA	CUGAUGA	X	GAA	AUAGUGGA	UCCACUAUC	UCACACUA
	5458	AUUAGUGU	CUGAUGA	X	GAA	AGAUAGUG	CACUAUCUC	ACACUAAU
10	5464	UUUCAGAU	CUGAUGA	X	GAA	AGUGUGAG	CUCACACUA	AUCUGAAA
	5467	UCCUUUCA	CUGAUGA	X	GAA	AUUAGUGU	ACACUAAUC	UGAAAGGA
	5489	CGCCAGCU	CUGAUGA	X	GAA	AUGCUCUU	AAGAGCAUU	AGCUGGCG
	5490	GCGCCAGC	CUGAUGA	X	GAA	AAUGCUCU	AGAGCAUUA	GCUGGCGC
	5501	GUGCUIAA	CUGAUGA	X	GAA	AUGCGCCA	UGGCGCAUA	UUAAGCAC
15	5503	AAGUGCUU	CUGAUGA	X	GAA	AUAUGCGC	GCGCAUUAU	AAGCACUU
	5504	AAAGUGCU	CUGAUGA	X	GAA	AAUAUGCG	CGCAUUAUA	AGCACUUU
	5511	GGAGCUUA	CUGAUGA	X	GAA	AGUGCUUA	UAAGCACUU	UAAGCUCC
	5512	AGGAGCUU	CUGAUGA	X	GAA	AAGUGCUU	AAGCACUUU	AAGCUCCU
	5513	AAGGAGCU	CUGAUGA	X	GAA	AAAGUGCU	AGCACUUUA	AGCUCCUU
20	5518	UACUCAAG	CUGAUGA	X	GAA	AGCUUAAA	UUUAAGCUC	CUUGAGUA
	5521	UUUUACUC	CUGAUGA	X	GAA	AGGAGCUU	AAGCUCCUU	GAGUAAAA
	5526	CACCUUUU	CUGAUGA	X	GAA	ACUCAAGG	CCUUGAGUA	AAAAGGUG
	5537	AAAUUACA	CUGAUGA	X	GAA	ACCACCUU	AAGGUGGUA	UGUAAUUU
	5541	GCAUAAAU	CUGAUGA	X	GAA	ACAUACCA	UGGUAUGUA	AUUUAUGC
25	5544	CUUGCAUA	CUGAUGA	X	GAA	AUUACAUA	UAUGUAAUU	UAUGCAAG
	5545	CCUUGCAU	CUGAUGA	X	GAA	AAUUACAU	AUGUAAUUU	AUGCAAGG
	5546	ACCUUGCA	CUGAUGA	X	GAA	AAAUUACA	UGUAAUUUA	UGCAAGGU
	5555	UGGAGAAA	CUGAUGA	X	GAA	ACCUUGCA	UGCAAGGUA	UUUCUCCA
	5557	ACUGGAGA	CUGAUGA	X	GAA	AUACCUUG	CAAGGUUUU	UCUCCAGU
30	5558	AACUGGAG	CUGAUGA	X	GAA	AAUACCUU	AAGGUUUUU	CUCCAGUU
	5559	CAACUGGA	CUGAUGA	X	GAA	AAAUACCU	AGGUUUUUC	UCCAGUUG
	5561	CCCAACUG	CUGAUGA	X	GAA	AGAAAUAC	GUUUUUUCUC	CAGUUGGG
	5566	UGAGUCCC	CUGAUGA	X	GAA	ACUGGAGA	UCUCCAGUU	GGGACUCA

	5573	AAUAUCCU	CUGAUGA	X	GAA	AGUCCCAA	UUGGGACUC	AGGAUAUU
	5579	UUAACUAA	CUGAUGA	X	GAA	AUCCUGAG	CUCAGGAUA	UUAGUUAA
	5581	CAUUAACU	CUGAUGA	X	GAA	AUAUCCUG	CAGGAUAUU	AGUUA AUG
	5582	UCAUUAAC	CUGAUGA	X	GAA	AAUAUCCU	AGGAUAUUA	GUUAAUGA
5	5585	GGCUCAUU	CUGAUGA	X	GAA	ACUAAUUAU	AUAUUAGUU	AAUGAGCC
	5586	UGGCUCAU	CUGAUGA	X	GAA	AACUAAUA	UAUUAGUUA	AUGAGCCA
	5596	CUUCUAGU	CUGAUGA	X	GAA	AUGGCUCA	UGAGCCAUC	ACUAGAAG
	5600	UUUUCUUC	CUGAUGA	X	GAA	AGUGAUGG	CCAUCACUA	GAAGAAAA
	5615	CAGUUGAA	CUGAUGA	X	GAA	AUGGGCUU	AAGCCCAUU	UUCAACUG
10	5616	GCAGUUGA	CUGAUGA	X	GAA	AAUGGGCU	AGCCCAUUU	UCAACUGC
	5617	AGCAGUUG	CUGAUGA	X	GAA	AAAUGGGC	GCCCAUUUU	CAACUGCU
	5618	AAGCAGUU	CUGAUGA	X	GAA	AAAAUGGG	CCCAUUUUC	AACUGCUU
	5626	AAGUUUCA	CUGAUGA	X	GAA	AGCAGUUG	CAACUGCUU	UGAAACUU
	5627	CAAGUUUC	CUGAUGA	X	GAA	AAGCAGUU	AACUGCUUU	GAAACUUG
15	5634	CCCCAGGC	CUGAUGA	X	GAA	AGUUUCAA	UUGAAACUU	GCCUGGGG
	5644	CAUGCUCU	CUGAUGA	X	GAA	ACCCCAGG	CCUGGGGUC	UGAGCAUG
	5661	UGUCUCCC	CUGAUGA	X	GAA	AUUCCTAU	AUGGGAAUA	GGGAGACA
	5674	CCCUUUC	CUGAUGA	X	GAA	ACCCUGUC	GACAGGGUA	GGAAAGGG
	5688	CUGAAGAG	CUGAUGA	X	GAA	AGGCGCCC	GGGCGCCUA	CUCUUCAG
20	5691	ACCCUGAA	CUGAUGA	X	GAA	AGUAGGCG	CGCCUACUC	UUCAGGGU
	5693	AGACCCUG	CUGAUGA	X	GAA	AGAGUAGG	CCUACUCUU	CAGGGUCU
	5694	UAGACCCU	CUGAUGA	X	GAA	AAGAGUAG	CUACUCUUC	AGGGUCUA
	5700	GAUCUUUA	CUGAUGA	X	GAA	ACCCUGAA	UUCAGGGUC	UAAAGAUC
	5702	UUGAUCUU	CUGAUGA	X	GAA	AGACCCUG	CAGGGUCUA	AAGAUCAA
25	5708	GCCCACUU	CUGAUGA	X	GAA	AUCUUUAG	CUAAAGAUC	AAGUGGGC
	5719	AGCGAUCC	CUGAUGA	X	GAA	AGGCCCAC	GUGGGCCUU	GGAUCGCU
	5724	AGCUUAGC	CUGAUGA	X	GAA	AUCCAAGG	CCUUGGAUC	GCUAAGCU
	5728	AGCCAGCU	CUGAUGA	X	GAA	AGCGAUCC	GGAUCGCUA	AGCUGGCU
	5737	AUCAACA	CUGAUGA	X	GAA	AGCCAGCU	AGCUGGCUC	UGUUUGAU
30	5741	UAGCAUCA	CUGAUGA	X	GAA	ACAGAGCC	GGCUCUGUU	UGAUGCUA
	5742	AUAGCAUC	CUGAUGA	X	GAA	AACAGAGC	GCUCUGUUU	GAUGCUAU
	5749	UGCAUAAA	CUGAUGA	X	GAA	AGCAUCAA	UUGAUGCUA	UUUAUGCA
	5751	CUUGCAUA	CUGAUGA	X	GAA	AUAGCAUC	GAUGCUAUU	UAUGCAAG

5752	ACUUGCAU	CUGAUGA	X	GAA	AAUAGCAU	AUGCUAUUU	AUGCAAGU	
5753	AACUUGCA	CUGAUGA	X	GAA	AAAUAGCA	UGCUAUUUUA	UGCAAGUU	
5761	UAGACCCU	CUGAUGA	X	GAA	ACUUGCAU	AUGCAAGUU	AGGGUCUA	
5762	AUAGACCC	CUGAUGA	X	GAA	AACUUGCA	UGCAAGUUUA	GGGUCUAU	
5	5767	AAUACAUA	CUGAUGA	X	GAA	ACCCUAAC	GUUAGGGUC	UAUGUAUU
5769	UAAAUACA	CUGAUGA	X	GAA	AGACCCUA	UAGGGUCUA	UGUAUUUA	
5773	AUCCUAAA	CUGAUGA	X	GAA	ACAUAGAC	GUCUAUGUA	UUUAGGAU	
5775	GCAUCCUA	CUGAUGA	X	GAA	AUACAUAU	CUAUGUAUU	UAGGAUGC	
5776	CGCAUCCU	CUGAUGA	X	GAA	AAUACAUA	UAUGUAUUU	AGGAUGCG	
10	5777	GCGCAUCC	CUGAUGA	X	GAA	AAAUACAUA	AUGUAUUUA	GGAUGCGC
5788	CUGAAGAG	CUGAUGA	X	GAA	AGGCGCAU	AUGCGCCUA	CUCUUCAG	
5791	ACCCUGAA	CUGAUGA	X	GAA	AGUAGGCG	CGCCUACUC	UUCAGGGU	
5793	AGACCCUG	CUGAUGA	X	GAA	AGAGUAGG	CCUACUCUU	CAGGGUCU	
5794	UAGACCCU	CUGAUGA	X	GAA	AAGAGUAG	CUACUCUUC	AGGGUCUA	
15	5800	GAUCUUUA	CUGAUGA	X	GAA	ACCCUGAA	UUCAGGGUC	UAAAGAUC
5802	UUGAUCUU	CUGAUGA	X	GAA	AGACCCUG	CAGGGUCUA	AAGAUCAA	
5808	GCCCACUU	CUGAUGA	X	GAA	AUCUUUAG	CUAAAGAUC	AAGUGGGC	
5819	AGCGAUCC	CUGAUGA	X	GAA	AGGCCAC	GUGGGCCUU	GGAUCGCU	
5824	AGCUUAGC	CUGAUGA	X	GAA	AUCCAAGG	CCUUGGAUC	GCUAAGCU	
20	5828	AGCCAGCU	CUGAUGA	X	GAA	AGCGAUCC	GGAUCGCUA	AGCUGGCU
5837	AUCAAACA	CUGAUGA	X	GAA	AGCCAGCU	AGCUGGCUC	UGUUUGAU	
5841	UAGCAUCA	CUGAUGA	X	GAA	ACAGAGCC	GGCUCUGUU	UGAUGCUA	
5842	AUAGCAUC	CUGAUGA	X	GAA	AACAGAGC	GCUCUGUUU	GAUGCUAU	
5849	UGCAUAAA	CUGAUGA	X	GAA	AGCAUCAA	UUGAUGCUA	UUUAUGCA	
25	5851	CUUGCAUA	CUGAUGA	X	GAA	AUAGCAUC	GAUGCUAUU	UAUGCAAG
5852	ACUUGCAU	CUGAUGA	X	GAA	AAUAGCAU	AUGCUAUUU	AUGCAAGU	
5853	AACUUGCA	CUGAUGA	X	GAA	AAAUAGCA	UGCUAUUUUA	UGCAAGUU	
5861	UAGACCCU	CUGAUGA	X	GAA	ACUUGCAU	AUGCAAGUU	AGGGUCUA	
5862	AUAGACCC	CUGAUGA	X	GAA	AACUUGCA	UGCAAGUUUA	GGGUCUAU	
30	5867	AAUACAUA	CUGAUGA	X	GAA	ACCCUAAC	GUUAGGGUC	UAUGUAUU
5869	UAAAUACA	CUGAUGA	X	GAA	AGACCCUA	UAGGGUCUA	UGUAUUUA	
5873	AUCCUAAA	CUGAUGA	X	GAA	ACAUAGAC	GUCUAUGUA	UUUAGGAU	
5875	ACAUCCUA	CUGAUGA	X	GAA	AUACAUAU	CUAUGUAUU	UAGGAUGU	

5876	GACAUCCU	CUGAUGA	X	GAA	AAUACAUA	UAUGUAUUU	AGGAUGUC	
5877	AGACAUCC	CUGAUGA	X	GAA	AAAUACAU	AUGUAUUUA	GGAUGUCU	
5884	AAGGUGCA	CUGAUGA	X	GAA	ACAUCCUA	UAGGAUGUC	UGCACCTU	
5892	GGCUGCAG	CUGAUGA	X	GAA	AGGUGCAG	CUGCACCTU	CUGCAGCC	
5	5893	UGGCUGCA	CUGAUGA	X	GAA	AAGGUGCA	UGCACCTUC	UGCAGCCA
5904	CAGCUUCU	CUGAUGA	X	GAA	ACUGGCUG	CAGCCAGUC	AGAAGCTUG	
5930	GAAGCAGC	CUGAUGA	X	GAA	AUCCACUG	CAGUGGAUU	GCUGCUUC	
5937	UCCCCAAG	CUGAUGA	X	GAA	AGCAGCAA	UUGCUGCUU	CUUGGGGA	
5938	CUCCCCAA	CUGAUGA	X	GAA	AAGCAGCA	UGCUGCUUC	UUGGGGAG	
10	5940	UUCUCCCC	CUGAUGA	X	GAA	AGAAGCAG	CUGCUCUUU	GGGGAGAA
5953	AGGAAGCA	CUGAUGA	X	GAA	ACUCUUCU	AGAAGAGUA	UGCUCUCC	
5958	AUAAAAGG	CUGAUGA	X	GAA	AGCAUACU	AGUAUGCUU	CCUUUUUAU	
5959	GAUAAAAG	CUGAUGA	X	GAA	AAGCAUAC	GUAUGCUUC	CUUUUAUC	
5962	AUGGAUAA	CUGAUGA	X	GAA	AGGAAGCA	UGCUUCCUU	UUAUCCAU	
15	5963	CAUGGAUA	CUGAUGA	X	GAA	AAGGAAGC	GCUUCCUUU	UAUCCAUG
5964	ACAUGGAU	CUGAUGA	X	GAA	AAAGGAAG	CUUCCUUUU	AUCCAUGU	
5965	UACAUGGA	CUGAUGA	X	GAA	AAAAGGAA	UUCCUUUUA	UCCAUGUA	
5967	AUUACAUG	CUGAUGA	X	GAA	AUAAAAGG	CCUUUUUUC	CAUGUAAU	
5973	AGUUAAAU	CUGAUGA	X	GAA	ACAUGGAU	AUCCAUGUA	AUUUAACU	
20	5976	UACAGUUA	CUGAUGA	X	GAA	AUUACAUG	CAUGUAAUU	UACUGUA
5977	CUACAGUU	CUGAUGA	X	GAA	AAUUACAU	AUGUAAUUU	AACUGUAG	
5978	UCTACAGU	CUGAUGA	X	GAA	AAAUUACA	UGUAAUUUA	ACUGUAGA	
5984	UCAGGUUC	CUGAUGA	X	GAA	ACAGUUAA	UUAAUGUA	GAACCUGA	
5996	GUUACUUA	CUGAUGA	X	GAA	AGCUCAGG	CCUGAGCUC	UAAGUAAC	
25	5998	CGGUUACU	CUGAUGA	X	GAA	AGAGCUCA	UGAGCUCUA	AGUAACCG
6002	UCUUCGGU	CUGAUGA	X	GAA	ACUUAGAG	CUCUAAGUA	ACCGAAGA	
6015	CAGAGGCA	CUGAUGA	X	GAA	ACAUUCUU	AAGAAUGUA	UGCCUCUG	
6021	UAAGAACA	CUGAUGA	X	GAA	AGGCAUAC	GUAUGCCUC	UGUUCUUA	
6025	CACAUAA	CUGAUGA	X	GAA	ACAGAGGC	GCCUCUGUU	CUUAUGUG	
30	6026	GCACAUAA	CUGAUGA	X	GAA	AACAGAGG	CCUCUGUUC	UUAUGUGC
6028	UGGCACAU	CUGAUGA	X	GAA	AGAACAGA	UCUGUUCUU	AUGUGCCA	
6029	GUGGCACA	CUGAUGA	X	GAA	AAGAACAG	CUGUUCUUA	UGUGCCAC	
6040	UAAACAAG	CUGAUGA	X	GAA	AUGUGGCA	UGCCACAUC	CUUGUUUA	

6043	CUUUAAC	CUGAUGA	X	GAA	AGGAUGUG	CACAUCCUU	GUUUAAG
6046	AGCCUUUA	CUGAUGA	X	GAA	ACAAGGAU	AUCCUUGUU	UAAAGGCU
6047	GAGCCUUU	CUGAUGA	X	GAA	AACAAGGA	UCCUUGUUU	AAAGGCUC
6048	AGAGCCUU	CUGAUGA	X	GAA	AAACAAGG	CCUUGUUUA	AAGGCUCU
5	6055	CAUACAGA	CUGAUGA	X	GAA	AGCCUUUA	UAAAGGCUC
	6057	UUCAUACA	CUGAUGA	X	GAA	AGAGCCUU	AAGGCUCUC
	6061	UCUCUUCA	CUGAUGA	X	GAA	ACAGAGAG	CUCUCUGUA
	6079	GUGCUGAU	CUGAUGA	X	GAA	ACGGUCCC	GGGACCGUC
	6082	AAUGUGCU	CUGAUGA	X	GAA	AUGACGGU	ACCGUCAUC
10	6090	CACUAGGG	CUGAUGA	X	GAA	AUGUGCUG	CAGCACAUU
	6091	UCACUAGG	CUGAUGA	X	GAA	AAUGUGCU	AGCACAUUC
	6095	AGGCUCAC	CUGAUGA	X	GAA	AGGGA AUG	CAUCCCUA
	6104	GGAGCCAG	CUGAUGA	X	GAA	AGGCUCAC	GUGAGCCUA
	6111	GCUGCCAG	CUGAUGA	X	GAA	AGCCAGUA	UACUGGCUC
15	6124	UUCCACAA	CUGAUGA	X	GAA	AGCCGCUG	CAGCGGCUU
	6125	CUUCCACA	CUGAUGA	X	GAA	AAGCCGCU	AGCGGCUUU
	6126	UCUCCAC	CUGAUGA	X	GAA	AAAGCCGC	GCGGCUUUU
	6137	UGGCUAGU	CUGAUGA	X	GAA	AGUCUUC	GGAAGACUC
	6141	CUUCUGGC	CUGAUGA	X	GAA	AGUGAGUC	GACUCACUA
20	6166	GUGGAGAG	CUGAUGA	X	GAA	ACUGUCCC	GGGACAGUC
	6169	UUGGUGGA	CUGAUGA	X	GAA	AGGACUGU	ACAGUCCUC
	6171	UCUUGGUG	CUGAUGA	X	GAA	AGAGGACU	AGUCCUCUC
	6181	UGGAUUUA	CUGAUGA	X	GAA	AUCUUGGU	ACCAAGAUC
	6183	UUUGGAUU	CUGAUGA	X	GAA	AGAUCUUG	CAAGAUCUA
25	6187	UUUGUUUG	CUGAUGA	X	GAA	AUUUAGAU	AUCUAAAUC
	6204	UCUGGCUC	CUGAUGA	X	GAA	AGCCUGCU	AGCAGGCUA
	6226	ACAACAAA	CUGAUGA	X	GAA	AUUUGUCC	GGACAAAUC
	6228	GAACAACA	CUGAUGA	X	GAA	AGAUUUGU	ACAAAUCUU
	6229	GGAACAAC	CUGAUGA	X	GAA	AAGAUUUG	CAAAUCUUU
30	6232	AGAGGAAC	CUGAUGA	X	GAA	ACAAAGAU	AUCUUUGUU
	6235	AGAAGAGG	CUGAUGA	X	GAA	ACAACAAA	UUUGUUUGU
	6236	AAGAAGAG	CUGAUGA	X	GAA	AACAACAA	UUGUUGUUC
	6239	GUAAAGAA	CUGAUGA	X	GAA	AGGAACAA	UUGUCCUC

	6241	GUGUAAAG	CUGAUGA	X	GAA	AGAGGAAC	GUUCCUCUU	CUUUACAC
	6242	UGUGUAAA	CUGAUGA	X	GAA	AAGAGGAA	UUCUCUUC	UUUACACA
	6244	UAUGUGUA	CUGAUGA	X	GAA	AGAAGAGG	CCUCUUCUU	UACACAU
	6245	GUAUGUGU	CUGAUGA	X	GAA	AAGAAGAG	CUCUUCUU	ACACAUAC
5	6246	CGUAUGUG	CUGAUGA	X	GAA	AAAGAAGA	UCUUCUU	CACAUACG
	6252	GGUUUGCG	CUGAUGA	X	GAA	AUGUGUAA	UUACACAU	CGCAAACC
	6280	AUUUAUAA	CUGAUGA	X	GAA	AUUGCCAG	CUGGCAAU	UUUAAAAU
	6281	GAUUUAUA	CUGAUGA	X	GAA	AAUUGCCA	UGGCAAUU	UUAUAAUC
	6282	UGAUUUUA	CUGAUGA	X	GAA	AAUUGCC	GGCAAUUU	AUAAAUCA
10	6283	CUGAUUUA	CUGAUGA	X	GAA	AAAAUUGC	GCAAUUUU	UAAAUUCAG
	6285	ACCUGAUU	CUGAUGA	X	GAA	AUAAAAUU	AAUUUUUA	AAUCAGGU
	6289	AGUUACCU	CUGAUGA	X	GAA	AUUUAUAA	UUUAAAAUC	AGGUAACU
	6294	CUUCCAGU	CUGAUGA	X	GAA	ACCUGAUU	AAUCAGGUA	ACUGGAAG
	6308	CUGAGUUU	CUGAUGA	X	GAA	ACCUCUUU	AAGGAGGUU	AAACUCAG
15	6309	UCUGAGUU	CUGAUGA	X	GAA	AACCUCUU	AGGAGGUU	AACUCAGA
	6314	UUUUUUCU	CUGAUGA	X	GAA	AGUUUAAC	GUUAAACUC	AGAAAAAA
	6331	AAUUGACU	CUGAUGA	X	GAA	AGGUCUUC	GAAGACCUC	AGUCAAUU
	6335	AGAGAAUU	CUGAUGA	X	GAA	ACUGAGGU	ACCUCAGUC	AAUUCUCU
	6339	AAGUAGAG	CUGAUGA	X	GAA	AUUGACUG	CAGUCAAUU	CUCUACUU
20	6340	AAAGUAGA	CUGAUGA	X	GAA	AAUUGACU	AGUCAAUUC	UCUACUUU
	6342	AAAAAGUA	CUGAUGA	X	GAA	AGAAUUGA	UCAAUUCUC	UACUUUUU
	6344	AAAAAAAG	CUGAUGA	X	GAA	AGAGAAUU	AAUUCUCUA	CUUUUUUU
	6347	AAAAAAA	CUGAUGA	X	GAA	AGUAGAGA	UCUCUACUU	UUUUUUUU
	6348	AAAAAAA	CUGAUGA	X	GAA	AAGUAGAG	CUCUACUUU	UUUUUUUU
25	6349	AAAAAAA	CUGAUGA	X	GAA	AAAGUAGA	UCUACUUUU	UUUUUUUU
	6350	AAAAAAA	CUGAUGA	X	GAA	AAAAGUAG	CUACUUUUU	UUUUUUUU
	6351	AAAAAAA	CUGAUGA	X	GAA	AAAAAGUA	UACUUUUUU	UUUUUUUU
	6352	AAAAAAA	CUGAUGA	X	GAA	AAAAAGU	ACUUUUUUU	UUUUUUUU
	6353	AAAAAAA	CUGAUGA	X	GAA	AAAAAAG	CUUUUUUUU	UUUUUUUU
30	6354	GAAAAAAA	CUGAUGA	X	GAA	AAAAAAA	UUUUUUUUU	UUUUUUUC
	6355	GGAAAAAA	CUGAUGA	X	GAA	AAAAAAA	UUUUUUUUU	UUUUUUCC
	6356	UGGAAAAA	CUGAUGA	X	GAA	AAAAAAA	UUUUUUUUU	UUUUUCCA
	6357	UUGGAAAA	CUGAUGA	X	GAA	AAAAAAA	UUUUUUUUU	UUUUUCAA

	6358	UUUGGAAA	CUGAUGA	X	GAA	AAAAAAA	UUUUUUUU	UUUCCAAA
	6359	AUUUGGAA	CUGAUGA	X	GAA	AAAAAAA	UUUUUUUU	UUCCAAAU
	6360	GAUUUGGA	CUGAUGA	X	GAA	AAAAAAA	UUUUUUUU	UCCAAAU
	6361	UGAUUUGG	CUGAUGA	X	GAA	AAAAAAA	UUUUUUUU	CCAAAUCA
5	6362	CUGAUUUG	CUGAUGA	X	GAA	AAAAAAA	UUUUUUUU	CAAAUCAG
	6368	UAUUAUCU	CUGAUGA	X	GAA	AUUUGGAA	UUCCAAAU	AGAUAAUA
	6373	UGGGCUAU	CUGAUGA	X	GAA	AUCUGAUU	AAUCAGAU	AUAGCCCA
	6376	UGCUGGGC	CUGAUGA	X	GAA	AUUAUCUG	CAGAUAAU	GCCCAGCA
	6388	GUUAUCAC	CUGAUGA	X	GAA	AUUUGCUG	CAGCAAUA	GUGAUAAC
10	6394	UUAUUUGU	CUGAUGA	X	GAA	AUCACUAA	AUAGUGAU	ACAAUAA
	6401	UAAGGUUU	CUGAUGA	X	GAA	AUUUGUUA	UAACAAUA	AAACCUUA
	6408	GAACAGCU	CUGAUGA	X	GAA	AGGUUUUA	UAAAACCU	AGCUGUUC
	6409	UGAACAGC	CUGAUGA	X	GAA	AAGGUUUU	AAAACCUUA	GCUGUUCA
	6415	AAGACAUG	CUGAUGA	X	GAA	ACAGCUAA	UUAGCUGU	CAUGUCUU
15	6416	CAAGACAU	CUGAUGA	X	GAA	AACAGCUA	UAGCUGUUC	AUGUCUUG
	6421	GAAAUCAA	CUGAUGA	X	GAA	ACAUGAAC	GUUCAUGU	UUGAUUUC
	6423	UUGAAAU	CUGAUGA	X	GAA	AGACAUGA	UCAUGUCU	GAUUUCA
	6427	AUUUAUGA	CUGAUGA	X	GAA	AUCAAGAC	GUCUUGAU	UCAAUAAU
	6428	AAUUUAUG	CUGAUGA	X	GAA	AAUCAAGA	UCUUGAUU	CAAUAAUU
20	6429	UAAUUAUU	CUGAUGA	X	GAA	AAAUCAAG	CUUGAUUUC	AAUAAUUA
	6433	GAAUUAUU	CUGAUGA	X	GAA	AUUGAAAU	AUUUCAUA	AUUAAUUC
	6436	UAAGAAUU	CUGAUGA	X	GAA	AUUUAUGA	UCAAUAAU	AAUUCUUA
	6437	UUAAGAAU	CUGAUGA	X	GAA	AAUUAUUG	CAAUAAUA	AUUCUUA
	6440	UGAUUAAG	CUGAUGA	X	GAA	AUUAUUUA	UAAUUAUU	CUUAAUCA
25	6441	AUGAUUAA	CUGAUGA	X	GAA	AAUUAUUU	AAUUAUUUC	UUAUUAU
	6443	UAAUGAUU	CUGAUGA	X	GAA	AGAAUUAA	UUAAUUCU	AAUCAUUA
	6444	UUAUGAU	CUGAUGA	X	GAA	AAGAAUUA	UAAUUCUUA	AUCAUUA
	6447	CUUUUAUU	CUGAUGA	X	GAA	AUUAAGAA	UUCUUAUUC	AUUAAGAG
	6450	GGUCUCUU	CUGAUGA	X	GAA	AUGAUUAA	UUAUUAUU	AAGAGACC
30	6451	UGGUCUCU	CUGAUGA	X	GAA	AAUGAUUA	UAAUCAUU	AGAGACCA
	6461	GUUUUAUU	CUGAUGA	X	GAA	AUGGUCUC	GAGACCAU	AUAAAUAC
	6464	GGAGUAUU	CUGAUGA	X	GAA	AUUAUGGU	ACCAUAAU	AAUACUCC
	6468	AAAAGGAG	CUGAUGA	X	GAA	AUUUAUUU	UAAUAAUA	CUCCUUUU

	6471	UUGAAAAG	CUGAUGA	X	GAA	AGUAUUUA	UAAAUACUC	CUUUUCAA
	6474	CUCUUGAA	CUGAUGA	X	GAA	AGGAGUAU	AUACUCCUU	UUCAAGAG
	6475	UCUCUUGA	CUGAUGA	X	GAA	AAGGAGUA	UACUCCUUU	UCAAGAGA
	6476	UUCUCUUG	CUGAUGA	X	GAA	AAAGGAGU	ACUCCUUUU	CAAGAGAA
5	6477	UUUCUCUU	CUGAUGA	X	GAA	AAAAGGAG	CUCCUUUUC	AAGAGAAA
	6497	ACAAUUCU	CUGAUGA	X	GAA	AUGGUUUU	AAAACCAUU	AGAAUUGU
	6498	AACAAUUC	CUGAUGA	X	GAA	AAUGGUUU	AAACCAUUA	GAAUUGUU
	6503	UGAGUAAAC	CUGAUGA	X	GAA	AUUCVAAU	AUUAGAAUU	GUUACUCA
	6506	AGCUGAGU	CUGAUGA	X	GAA	ACAAUUCU	AGAAUUGUU	ACUCAGCU
10	6507	GAGCUGAG	CUGAUGA	X	GAA	AACAAUUC	GAAUUGUUA	CUCAGCUC
	6510	AAGGAGCU	CUGAUGA	X	GAA	AGUAACAA	UUGUUACUC	AGCUCCUU
	6515	GUUUGAAG	CUGAUGA	X	GAA	AGCUGAGU	ACUCAGCUC	CUUCAAAC
	6518	UGAGUUUG	CUGAUGA	X	GAA	AGGAGCUG	CAGCUCCUU	CAAACUCA
	6519	CUGAGUUU	CUGAUGA	X	GAA	AAGGAGCU	AGCUCCUUC	AAACUCAG
15	6525	ACAAACCU	CUGAUGA	X	GAA	AGUUUGAA	UUCAAACUC	AGGUUUGU
	6530	AUGCUACA	CUGAUGA	X	GAA	ACCUGAGU	ACUCAGGUU	UGUAGCAU
	6531	UAUGCUAC	CUGAUGA	X	GAA	AACCUGAG	CUCAGGUUU	GUAGCAUA
	6534	AUGUAUGC	CUGAUGA	X	GAA	ACAAACCU	AGGUUUGUA	GCAUACAU
	6539	GACUCAUG	CUGAUGA	X	GAA	AUGCUACA	UGUAGCAUA	CAUGAGUC
20	6547	GAUGGAUG	CUGAUGA	X	GAA	ACUCAUGU	ACAUGAGUC	CAUCCAUC
	6551	GACUGAUG	CUGAUGA	X	GAA	AUGGACUC	GAGUCCAUC	CAUCAGUC
	6555	CUUUGACU	CUGAUGA	X	GAA	AUGGAUGG	CCAUCCAUC	AGUCAAAAG
	6559	CAUUCUUU	CUGAUGA	X	GAA	ACUGAUGG	CCAUCAGUC	AAAGAAUG
	6570	CCAGAUGG	CUGAUGA	X	GAA	ACCAUUCU	AGAAUGGUU	CCAUCUGG
25	6571	UCCAGAUG	CUGAUGA	X	GAA	AACCAUUC	GAAUGGUUC	CAUCUGGA
	6575	AGACUCCA	CUGAUGA	X	GAA	AUGGAACC	GGUCCAUC	UGGAGUCU
	6582	UACAUUAA	CUGAUGA	X	GAA	ACUCCAGA	UCUGGAGUC	UUAAUGUA
	6584	UCUACAUU	CUGAUGA	X	GAA	AGACUCCA	UGGAGUCUU	AAUGUAGA
	6585	UUCUACAU	CUGAUGA	X	GAA	AAGACUCC	GGAGUCUUA	AUGUAGAA
30	6590	UUUCUUUC	CUGAUGA	X	GAA	ACAUUAAG	CUUAAUGUA	GAAAGAAA
	6609	AUUUUUAC	CUGAUGA	X	GAA	AGUCUCCA	UGGAGACUU	GUAAUAAU
	6612	CUCAUUAU	CUGAUGA	X	GAA	ACAAGUCU	AGACUUGUA	AUAAUGAG
	6615	UAGCUCAU	CUGAUGA	X	GAA	AUUACAAG	CUUGUAAUA	AUGAGCUA

	6623	UUUGUAAC	CUGAUGA	X	GAA	AGCUCAUU	AAUGAGCUA	GUUACAAA
	6626	CACUUUGU	CUGAUGA	X	GAA	ACUAGCUC	GAGCUAGUU	ACAAAGUG
	6627	GCACUUUG	CUGAUGA	X	GAA	AACUAGCU	AGCUAGUUA	CAAAGUGC
	6637	UAAUGAAC	CUGAUGA	X	GAA	AGCACUUU	AAAGUGCUU	GUUCAUUA
5	6640	UUUUAAUG	CUGAUGA	X	GAA	ACAAGCAC	GUGCUUGUU	CAUUAAAA
	6641	AUUUUAAU	CUGAUGA	X	GAA	AACAAGCA	UGCUUGUUC	AUUAAAAU
	6644	GCUAUUUU	CUGAUGA	X	GAA	AUGAACAA	UUGUUCAUU	AAAAUAGC
	6645	UGCUAUUU	CUGAUGA	X	GAA	AAUGAACA	UGUUCAUUA	AAAUAGCA
	6650	UUCAGUGC	CUGAUGA	X	GAA	AUUUUAAU	AUUAAAAUA	GCACUGAA
10	6662	CAUGUUUC	CUGAUGA	X	GAA	AUUUUCAG	CUGAAAAUU	GAAACAUG
	6674	UAUCAGUU	CUGAUGA	X	GAA	AUUCAUGU	ACAUGAAUU	AACUGAUA
	6675	UUAUCAGU	CUGAUGA	X	GAA	AAUUCAUG	CAUGAAUUA	ACUGAUAA
	6682	UGGAAUUA	CUGAUGA	X	GAA	AUCAGUUA	UACUGAUA	AUAUCCAA
	6685	GAUUGGAA	CUGAUGA	X	GAA	AUUAUCAG	CUGAUAAUA	UUCCAAUC
15	6687	AUGAUUGG	CUGAUGA	X	GAA	AUAUUAUC	GAUAAUAUU	CCAAUCAU
	6688	AAUGAUUG	CUGAUGA	X	GAA	AAUAUUAU	AUAUAUUC	CAAUCAUU
	6693	UGGCAAAU	CUGAUGA	X	GAA	AUUGGAAU	AUUCCAAUC	AUUUGCCA
	6696	AAAUGGCA	CUGAUGA	X	GAA	AUGAUUGG	CCAAUCAUU	UGCCAUUU
	6697	UAAAUUGG	CUGAUGA	X	GAA	AAUGAUUG	CAAUCAUUU	GCCAUUUA
20	6703	UUGUCAUA	CUGAUGA	X	GAA	AUGGCAAA	UUUGCCAUU	UAUGACAA
	6704	UUUGUCAU	CUGAUGA	X	GAA	AAUGGCAA	UUGCCAUUU	AUGACAAA
	6705	UUUUGUCA	CUGAUGA	X	GAA	AAAUGGCA	UGCCAUUUA	UGACAAAA
	6719	UUAGUGCC	CUGAUGA	X	GAA	ACCAUUUU	AAAUGGUU	GGCACUAA
	6726	UUCUUUGU	CUGAUGA	X	GAA	AGUGCCAA	UUGGCACUA	ACAAAGAA
25	6743	CUGAAAGG	CUGAUGA	X	GAA	AGUGCUCG	CGAGCACUU	CCUUUCAG
	6744	UCUGAAAG	CUGAUGA	X	GAA	AAGUGCUC	GAGCACUUC	CUUUCAGA
	6747	AACUCUGA	CUGAUGA	X	GAA	AGGAAGUG	CACUCCUUU	UCAGAGUU
	6748	AAACUCUG	CUGAUGA	X	GAA	AAGGAAGU	ACUCCUUUU	CAGAGUUU
	6749	GAAACUCU	CUGAUGA	X	GAA	AAAGGAAG	CUUCCUUUC	AGAGUUUC
30	6755	AUCUCAGA	CUGAUGA	X	GAA	ACUCUGAA	UUCAGAGUU	UCUGAGAU
	6756	UAUCUCAG	CUGAUGA	X	GAA	AACUCUGA	UCAGAGUUU	CUGAGAUU
	6757	UUAUCUCA	CUGAUGA	X	GAA	AAACUCUG	CAGAGUUUC	UGAGAUAA
	6764	ACGUACAU	CUGAUGA	X	GAA	AUCUCAGA	UCUGAGAUU	AUGUACGU

	6769	GUUCCACG	CUGAUGA	X	GAA	ACAUUAUC	GAUAAUGUA	CGUGGAAC
	6781	UCCACCCA	CUGAUGA	X	GAA	ACUGUUCC	GGAACAGUC	UGGGUGGA
	6814	AAGACACA	CUGAUGA	X	GAA	ACUUGCAC	GUGCAAGUC	UGUGUCUU
	6820	ACUGACAA	CUGAUGA	X	GAA	ACACAGAC	GUCUGUGUC	UUGUCAGU
5	6822	GGACUGAC	CUGAUGA	X	GAA	AGACACAG	CUGUGUCUU	GUCAGUCC
	6825	CUUGGACU	CUGAUGA	X	GAA	ACAAGACA	UGUCUUGUC	AGUCCAAG
	6829	ACUUCUUG	CUGAUGA	X	GAA	ACUGACAA	UUGUCAGUC	CAAGAAGU
	6851	CUAAAAUU	CUGAUGA	X	GAA	ACAUCUCG	CGAGAUGUU	AAUUUUAG
	6852	CCUAAAAU	CUGAUGA	X	GAA	AACAUCUC	GAGAUGUUA	AUUUUAGG
10	6855	GUCCCUAA	CUGAUGA	X	GAA	AUUAACAU	AUGUUAUU	UUAGGGAC
	6856	GGUCCCUA	CUGAUGA	X	GAA	AAUUAACA	UGUUAUUU	UAGGGACC
	6857	GGGUCCCU	CUGAUGA	X	GAA	AAAUUAAC	GUUAAUUU	AGGGACCC
	6858	CGGUCCCC	CUGAUGA	X	GAA	AAAAUUAA	UUAAUUUU	GGGACCCG
	6872	UAGGAAAC	CUGAUGA	X	GAA	AGGCACGG	CCGUGCCUU	GUUCCUA
15	6875	GGCUAGGA	CUGAUGA	X	GAA	ACAAGGCA	UGCCUUGUU	UCCUAGCC
	6876	GGGCUAGG	CUGAUGA	X	GAA	AACAAGGC	GCCUUGUUU	CCUAGCCC
	6877	UGGGCUAG	CUGAUGA	X	GAA	AAACAAGG	CCUUGUUUC	CUAGCCCA
	6880	UUGUGGGC	CUGAUGA	X	GAA	AGGAAACA	UGUUUCCUA	GCCCACAA
	6901	AUCUGUUU	CUGAUGA	X	GAA	AUGUUUGC	GCAAACAUC	AAACAGAU
20	6910	CUAGCGAG	CUGAUGA	X	GAA	AUCUGUUU	AAACAGAU	CUCGCUAG
	6913	AGGCUAGC	CUGAUGA	X	GAA	AGUAUCUG	CAGAUACUC	GCUAGCCU
	6917	AAUGAGGC	CUGAUGA	X	GAA	AGCGAGUA	UACUCGCUA	GCCUCAUU
	6922	AUUUAAAU	CUGAUGA	X	GAA	AGGCUAGC	GCUAGCCUC	AUUUAAAU
	6925	UCAAUUUA	CUGAUGA	X	GAA	AUGAGGCU	AGCCUCAUU	UAAAUUGA
25	6926	AUCAAUUU	CUGAUGA	X	GAA	AAUGAGGC	GCCUCAUUU	AAAUUGAU
	6927	AAUCAAUU	CUGAUGA	X	GAA	AAAUGAGG	CCUCAUUUA	AAUUGAUU
	6931	CUUUAAUC	CUGAUGA	X	GAA	AUUUAAAU	AUUUAAAU	GAUUAAAG
	6935	CCUCCUUU	CUGAUGA	X	GAA	AUCAAUUU	AAAUUGAUU	AAAGGAGG
	6936	UCCUCCUU	CUGAUGA	X	GAA	AAUCAAUU	AAUUGAUUA	AAGGAGGA
30	6951	CGGCCAAA	CUGAUGA	X	GAA	AUGCACUC	GAGUGCAUC	UUUGGCCG
	6953	GUCGGCCA	CUGAUGA	X	GAA	AGAUGCAC	GUGCAUCUU	UGGCCGAC
	6954	UGUCGGCC	CUGAUGA	X	GAA	AAGAUGCA	UGCAUCUUU	GGCCGACA
	6970	CACACAGU	CUGAUGA	X	GAA	ACACCACU	AGUGGUGUA	ACUGUGUG

	7026	AACACACA	CUGAUGA	X	GAA	ACACCCAC	GUGGGUGUA	UGUGUGUU
	7034	AUGCACAA	CUGAUGA	X	GAA	ACACACAU	AUGUGUGUU	UUGUGCAU
	7035	UAUGCACA	CUGAUGA	X	GAA	AACACACA	UGUGUGUUU	UGUGCAUA
	7036	UUAUGCAC	CUGAUGA	X	GAA	AAACACAC	GUGUGUUUU	GUGCAUAA
5	7043	UAAAUAGU	CUGAUGA	X	GAA	AUGCACAA	UUGUGCAUA	ACUAUUUA
	7047	UCCUUAAA	CUGAUGA	X	GAA	AGUUAUGC	GCAUAACUA	UUUAAGGA
	7049	UUUCCUUA	CUGAUGA	X	GAA	AUAGUUAU	AUAACUAUU	UAAGGAAA
	7050	GUUUCUUU	CUGAUGA	X	GAA	AAUAGUUA	UAACUAUUU	AAGGAAAC
	7051	AGUUUCCU	CUGAUGA	X	GAA	AAAUAGUU	AACUAUUUA	AGGAAACU
10	7065	AACUUUAA	CUGAUGA	X	GAA	AUUCAGU	ACUGGAAUU	UUAAAGUU
	7066	UAACUUUA	CUGAUGA	X	GAA	AAUUCAG	CUGGAAUUU	UAAAGUUA
	7067	GUAACUUU	CUGAUGA	X	GAA	AAAUUCCA	UGGAAUUUU	AAAGUUAC
	7068	AGUAACUU	CUGAUGA	X	GAA	AAAAUUC	GGAAUUUUA	AAGUUACU
	7073	AUAAAAGU	CUGAUGA	X	GAA	ACUUUAAA	UUUAAAGUU	ACUUUUAU
15	7074	UAUAAAAG	CUGAUGA	X	GAA	AACUUUAA	UUAAAGUUA	CUUUUAUA
	7077	UUGUAUAA	CUGAUGA	X	GAA	AGUAACUU	AAGUUACUU	UUUAACAA
	7078	UUUGUAUA	CUGAUGA	X	GAA	AAGUAACU	AGUUACUUU	UAUACAAA
	7079	GUUUGUAU	CUGAUGA	X	GAA	AAAGUAAC	GUUACUUUU	AUACAAAC
	7080	GGUUUGUA	CUGAUGA	X	GAA	AAAAGUAA	UUACUUUUA	UACAAACC
20	7082	UUGGUUUG	CUGAUGA	X	GAA	AUAAAAGU	ACUUUUUAU	CAAACCAA
	7095	GUAGCAUA	CUGAUGA	X	GAA	AUUCUUGG	CCAAGAAUA	UAUGCUC
	7097	CUGUAGCA	CUGAUGA	X	GAA	AUAUUCUU	AAGAAUAUA	UGCUCACAG
	7102	UAUAUCUG	CUGAUGA	X	GAA	AGCAUAUA	UAUAUCGUA	CAGAUUAU
	7108	CUGUCUUA	CUGAUGA	X	GAA	AUCUGUAG	CUACAGUAU	UAAGACAG
25	7110	GUCUGUCU	CUGAUGA	X	GAA	AUAUCUGU	ACAGAUUAU	AGACAGAC
	7124	UAGGACCA	CUGAUGA	X	GAA	ACCAUGUC	GACAUGGUU	UGGUCCUA
	7125	AUAGGACC	CUGAUGA	X	GAA	AACCAUGU	ACAUGGUUU	GGUCCUAU
	7129	AAAUUAUAG	CUGAUGA	X	GAA	ACCAAACC	GGUUUGGUC	CUAUUUUU
	7132	UAGAAUAU	CUGAUGA	X	GAA	AGGACCAA	UUGGUCCUA	UAUUUCUA
30	7134	ACUAGAAA	CUGAUGA	X	GAA	AUAGGACC	GGUCCUAUA	UUUCUAGU
	7136	UGACUAGA	CUGAUGA	X	GAA	AUAUAGGA	UCCUAUAUU	UCUAGUCA
	7137	AUGACUAG	CUGAUGA	X	GAA	AAUAUAGG	CCUAUAUUU	CUAGUCAU
	7138	CAUGACUA	CUGAUGA	X	GAA	AAUAUAG	CUAUUUUUC	UAGUCAUG

	7140	AUCAUGAC	CUGAUGA	X	GAA	AGAAAUAU	AUAUUUCUA	GUCAUGAU
	7143	UUCAUCAU	CUGAUGA	X	GAA	ACUAGAAA	UUUCUAGUC	AUGAUGAA
	7155	AUACAAAA	CUGAUGA	X	GAA	ACAUUCAU	AUGAAUGUA	UUUUGUAU
	7157	GUUAACAA	CUGAUGA	X	GAA	AUACAUUC	GAAUGUAUU	UUGUAUAC
5	7158	GGUAUACA	CUGAUGA	X	GAA	AAUACAUU	AAUGUAUUU	UGUAUACC
	7159	UGGUAUAC	CUGAUGA	X	GAA	AAAUACAU	AUGUAUUUU	GUUAACCA
	7162	AGAUGGUA	CUGAUGA	X	GAA	ACAAAAUA	UAUUUUGUA	UACCAUCU
	7164	GAAGAUGG	CUGAUGA	X	GAA	AUACAAAA	UUUUGUAUA	CCAUCUUC
	7169	UAUAUGAA	CUGAUGA	X	GAA	AUGGUAVA	UAUACCAUC	UUCAUUA
10	7171	AUUUAUUG	CUGAUGA	X	GAA	AGAUGGUA	UACCAUCUU	CAUAUAAU
	7172	UAUUUAUU	CUGAUGA	X	GAA	AGAUGGU	ACCAUCUUC	AUAUAAUA
	7175	GUUAUUUA	CUGAUGA	X	GAA	AUGAAGAU	AUCUUCUA	UAAUAUAC
	7177	AAGUAUUA	CUGAUGA	X	GAA	AUAUGAAG	CUUCAUUA	AUAUACUU
	7180	UUUAAGUA	CUGAUGA	X	GAA	AUUAUAUG	CAUAUAAUA	UACUAAAA
15	7182	UUUUUAAG	CUGAUGA	X	GAA	AUAUUUAU	UAUAAUAUA	CUUAAAAA
	7185	AUAUUUUU	CUGAUGA	X	GAA	AGUAUAUU	AAUAUACUU	AAAAUAUU
	7186	AAUAUUUU	CUGAUGA	X	GAA	AAGUAUAU	AUAUACUUA	AAAAUAUU
	7192	UUAAGAAA	CUGAUGA	X	GAA	AUUUUUAA	UUAAAAUA	UUUCUAAA
	7194	AAUUAAGA	CUGAUGA	X	GAA	AUAUUUUU	AAAAUAUU	UCUAAAUU
20	7195	CAAUUAAG	CUGAUGA	X	GAA	AAUAUUUU	AAAAUAUUU	CUUAAUUG
	7196	CCAAUUA	CUGAUGA	X	GAA	AAAUUUUU	AAAUUUUUC	UUAAUUGG
	7198	UCCCAAUU	CUGAUGA	X	GAA	AGAAAUUU	AUAUUUCUU	AAUUGGGA
	7199	AUCCCAAU	CUGAUGA	X	GAA	AAGAAUAU	UAUUUCUUA	AUUGGGAU
	7202	CAAAUCCC	CUGAUGA	X	GAA	AUUAAGAA	UUCUUAUU	GGGAUUUG
25	7208	CGAUUACA	CUGAUGA	X	GAA	AUCCCAAU	AUUGGGAUU	UGUAUUCG
	7209	ACGAUUAC	CUGAUGA	X	GAA	AAUCCCAA	UUGGGAUUU	GUAAUUCG
	7212	GGUACGAU	CUGAUGA	X	GAA	ACAAAUCC	GGAUUUGUA	AUCGUACC
	7215	GUUGGUAC	CUGAUGA	X	GAA	AUUACAAA	UUUGUAAUC	GUACCAAC
	7218	UAAGUUGG	CUGAUGA	X	GAA	ACGAUUAC	GUAAUCGUA	CCAACUUA
30	7225	UAUCAAUU	CUGAUGA	X	GAA	AGUUGGUA	UACCAACUU	AAUUGAUA
	7226	UUAUCAAU	CUGAUGA	X	GAA	AAGUUGGU	ACCAACUUA	AUUGAUA
	7229	AGUUUAUC	CUGAUGA	X	GAA	AUUAAGUU	AACUUAUU	GAUAAACU
	7233	GCCAAGUU	CUGAUGA	X	GAA	AUCAAUUA	UAAUUGAUA	AACUUGGC

	7238	CAGUUGCC	CUGAUGA	X	GAA	AGUUUAUC	GAUAAACUU	GGCAACUG
	7249	GAACAUAA	CUGAUGA	X	GAA	AGCAGUUG	CAACUGCUU	UUAUGUUC
	7250	AGAACAUA	CUGAUGA	X	GAA	AAGCAGUU	AACUGCUUU	UAUGUUCU
	7251	CAGAACAU	CUGAUGA	X	GAA	AAAGCAGU	ACUGCUUUU	AUGUUCUG
5	7252	ACAGAACA	CUGAUGA	X	GAA	AAAAGCAG	CUGCUUUUA	UGUUCUGU
	7256	GGAGACAG	CUGAUGA	X	GAA	ACAUAAAA	UUUUAUGUU	CUGUCUCC
	7257	AGGAGACA	CUGAUGA	X	GAA	AACAUAAA	UUUAUGUUC	UGUCUCCU
	7261	UGGAAGGA	CUGAUGA	X	GAA	ACAGAACA	UGUUCUGUC	UCCUCCA
	7263	UAUGGAAG	CUGAUGA	X	GAA	AGACAGAA	UUCUGUCUC	CUCCAUA
10	7266	AUUUAUGG	CUGAUGA	X	GAA	AGGAGACA	UGUCUCCUU	CCAUAUUU
	7267	AAUUUAUG	CUGAUGA	X	GAA	AAGGAGAC	GUCUCCUUC	CAUAAAUU
	7271	GAAAAAUU	CUGAUGA	X	GAA	AUGGAAGG	CCUCCAUA	AAUUUUUC
	7275	UUUGAAA	CUGAUGA	X	GAA	AUUUAUGG	CCAUAUUU	UUUCAAAA
	7276	AUUUUGAA	CUGAUGA	X	GAA	AAUUUAUG	CAUAAAUUU	UUCAAAAU
15	7277	UAUUUUGA	CUGAUGA	X	GAA	AAAUUUAU	AUAAAUUUU	UCAAAAUU
	7278	GUAUUUUG	CUGAUGA	X	GAA	AAAAUUUA	UAAAUUUUU	CAAAAUAC
	7279	AGUAUUUU	CUGAUGA	X	GAA	AAAAAUUU	AAAUUUUUC	AAAAUACU
	7285	UGAAUUAG	CUGAUGA	X	GAA	AUUUUGAA	UUCAAAAUA	CUAAUUCA
	7288	UGUUGAAU	CUGAUGA	X	GAA	AGUAUUUU	AAAAUACUA	AUUCAACA
20	7291	CUUUGUUG	CUGAUGA	X	GAA	AUUAGUAA	AUACUAAUU	CAACAAAG
	7292	UCUUUGUU	CUGAUGA	X	GAA	AAUUAGUA	UACUAAUUC	AACAAAGA
	7308	AAAAAAA	CUGAUGA	X	GAA	AGCUUUUU	AAAAAGCUC	UUUUUUUU
	7310	GGAAAAA	CUGAUGA	X	GAA	AGAGCUUU	AAAGCUCUU	UUUUUUCC
	7311	AGGAAAA	CUGAUGA	X	GAA	AAGAGCUU	AAGCUCUUU	UUUUUCCU
25	7312	UAGGAAA	CUGAUGA	X	GAA	AAAGAGCU	AGCUCUUUU	UUUUCCUA
	7313	UUAGGAAA	CUGAUGA	X	GAA	AAAAGAGC	GCUCUUUUU	UUUCCUAA
	7314	UUUAGGAA	CUGAUGA	X	GAA	AAAAAGAG	CUCUUUUUU	UUCCUAAA
	7315	UUUUAGGA	CUGAUGA	X	GAA	AAAAAAGA	UCUUUUUUU	UCCUAAAA
	7316	AUUUUAGG	CUGAUGA	X	GAA	AAAAAAAG	CUUUUUUUU	CCUAAAAU
30	7317	UAUUUUAG	CUGAUGA	X	GAA	AAAAAAA	UUUUUUUUC	CUAAAAUA
	7320	GUUUUUUU	CUGAUGA	X	GAA	AGGAAAA	UUUUUCCUA	AAAUAAAC
	7325	UUUGAGUU	CUGAUGA	X	GAA	AUUUUAGG	CCUAAAAUA	AACUCAAA
	7330	AUAAAUUU	CUGAUGA	X	GAA	AGUUUAUU	AAUAAACUC	AAAUUUAU

	7335	CAAGGAUA	CUGAUGA	X	GAA	AUUUGAGU	ACUCAAAUU	UAUCCUUG
	7336	ACAAGGAU	CUGAUGA	X	GAA	AAUUUGAG	CUCAAAUUU	AUCCUUGU
	7337	AACAAGGA	CUGAUGA	X	GAA	AAAUUUGA	UCAAAUUUA	UCCUUGUU
	7339	UAAACAAG	CUGAUGA	X	GAA	AUAAAUUU	AAAUUUUUC	CUUGUUUA
5	7342	CUCUAAAC	CUGAUGA	X	GAA	AGGAUAAA	UUUAUCCUU	GUUUAGAG
	7345	CUGCUCUA	CUGAUGA	X	GAA	ACAAGGAU	AUCCUUGUU	UAGAGCAG
	7346	UCUGCUCU	CUGAUGA	X	GAA	AACAAGGA	UCCUUGUUU	AGAGCAGA
	7347	CUCUGCUC	CUGAUGA	X	GAA	AAACAAGG	CCUUGUUUA	GAGCAGAG
	7362	UUUUUCUU	CUGAUGA	X	GAA	AUUUUUCU	AGAAAAAUU	AAGAAAAA
10	7363	GUUUUUCU	CUGAUGA	X	GAA	AAUUUUUC	GAAAAAUUA	AGAAAAAC
	7373	CCAUUUCA	CUGAUGA	X	GAA	AGUUUUUC	GAAAAACUU	UGAAUUGG
	7374	ACCAUUUC	CUGAUGA	X	GAA	AAGUUUUU	AAAAACUUU	GAAUUGGU
	7383	UUUUUUGA	CUGAUGA	X	GAA	ACCAUUUC	GAAUUGGUC	UCAAAAAA
	7385	AAUUUUUU	CUGAUGA	X	GAA	AGACCAUU	AAUGGUCUC	AAAAAAUU
15	7393	UAUUUAGC	CUGAUGA	X	GAA	AUUUUUUG	CAAAAAAUU	GCUAAAUA
	7397	AAAAUAUU	CUGAUGA	X	GAA	AGCAAUUU	AAAUUGCUA	AAUAUUUU
	7401	AUUGAAAA	CUGAUGA	X	GAA	AUUUAGCA	UGCUGAAUA	UUUUCAAU
	7403	CCAUUGAA	CUGAUGA	X	GAA	AUAUUUAG	CUAAAUUUU	UCAAUGGG
	7404	UCCAUUGA	CUGAUGA	X	GAA	AAUAUUUA	UAAAUUUUU	UCAAUGGA
20	7405	UUCCAUUG	CUGAUGA	X	GAA	AAAUUUUU	AAAUUUUUU	CAAUGGAA
	7406	UUUCCAUU	CUGAUGA	X	GAA	AAAAUAUU	AAUAUUUUC	AAUGGAAA
	7418	CUAACAUU	CUGAUGA	X	GAA	AGUUUUCC	GGAAAACUA	AAUGUUAG
	7424	GUAAAACU	CUGAUGA	X	GAA	ACAUUUAG	CUAAAUGUU	AGUUUAGC
	7425	AGCUAAAC	CUGAUGA	X	GAA	AACAUUUA	UAAAUGUUA	GUUUAGCU
25	7428	AUCAGCUA	CUGAUGA	X	GAA	ACUAACAU	AUGUUAGUU	UAGCUGAU
	7429	AAUCAGCU	CUGAUGA	X	GAA	AACUAACA	UGUUAGUUU	AGCUGAUU
	7430	CAAUCAGC	CUGAUGA	X	GAA	AAACUAAC	GUUAGUUUA	GCUGAUUG
	7437	CCCCAUAC	CUGAUGA	X	GAA	AUCAGCUA	UAGCUGAUU	GUAUGGGG
	7440	AAACCCCA	CUGAUGA	X	GAA	ACAAUCAG	CUGAUUGUA	UGGGGUUU
30	7447	GGUUCGAA	CUGAUGA	X	GAA	ACCCCAUA	UAUGGGGUU	UUCGAACC
	7448	AGGUUCGA	CUGAUGA	X	GAA	AACCCCAU	AUGGGGUUU	UCCAACCU
	7449	AAGGUUCG	CUGAUGA	X	GAA	AAACCCCA	UGGGGUUUU	CGAACCUU
	7450	AAAGGUUC	CUGAUGA	X	GAA	AAAACCCC	GGGGUUUUC	GAACCUUU

	7457	AAAAGUGA	CUGAUGA	X	GAA	AGGUUCGA	UCGAACCUU	UCACUUUU
	7458	AAAAAGUG	CUGAUGA	X	GAA	AAGGUUCG	CGAACCUUU	CACUUUUU
	7459	CAAAAAGU	CUGAUGA	X	GAA	AAAGGUUC	GAACCUUUC	ACUUUUUG
	7463	CAAACAAA	CUGAUGA	X	GAA	AGUGAAAG	CUUUCACUU	UUUGUUUG
5	7464	ACAAACAA	CUGAUGA	X	GAA	AAGUGAAA	UUUCACUUU	UUGUUUGU
	7465	AACAAACA	CUGAUGA	X	GAA	AAAGUGAA	UUCACUUUU	UGUUUGUU
	7466	AAACAAAC	CUGAUGA	X	GAA	AAAAGUGA	UCACUUUUU	GUUUUGUU
	7469	GUAAAACA	CUGAUGA	X	GAA	ACAAAAAG	CUUUUGUUU	UGUUUUAC
	7470	GGUAAAAC	CUGAUGA	X	GAA	AACAAAAA	UUUUUGUUU	GUUUUACC
10	7473	AUAGGUAA	CUGAUGA	X	GAA	ACAAACAA	UUGUUUGUU	UUACCUAU
	7474	AAUAGGUA	CUGAUGA	X	GAA	AACAAACA	UGUUUGUUU	UACCUAUU
	7475	AAAUAGGU	CUGAUGA	X	GAA	AAACAAAC	GUUUGUUUU	ACCUAUUU
	7476	GAAAUAGG	CUGAUGA	X	GAA	AAAACAAA	UUUGUUUUA	CCUAUUUC
	7480	UUGUGAAA	CUGAUGA	X	GAA	AGGUAAAA	UUUUACCUA	UUUCACAA
15	7482	AGUUGUGA	CUGAUGA	X	GAA	AUAGGUAA	UUACCUAUU	UCACAACU
	7483	CAGUUGUG	CUGAUGA	X	GAA	AAUAGGUA	UACCUAUUU	CACAACUG
	7484	ACAGUUGU	CUGAUGA	X	GAA	AAAUAGGU	ACCUAUUUC	ACAACUGU
	7495	UGGCAAUU	CUGAUGA	X	GAA	ACACAGUU	AACUGUGUA	AAUUGCCA
	7499	UUAUUGGC	CUGAUGA	X	GAA	AUUUACAC	GUGUAAAUU	GCCAAUAA
20	7506	ACAGGAAU	CUGAUGA	X	GAA	AUUGGCAA	UUGCCAAUA	AUUCCUGU
	7509	UGGACAGG	CUGAUGA	X	GAA	AUUAUUGG	CCAAUAAUU	CCUGUCCA
	7510	AUGGACAG	CUGAUGA	X	GAA	AAUUAUUG	CAAUAAUUC	CUGUCCAU
	7515	UUUUCAUG	CUGAUGA	X	GAA	ACAGGAAU	AUUCCUGUC	CAUGAAAA
	7531	CACUGGAU	CUGAUGA	X	GAA	AUUUGCAU	AUGCAAUUU	AUCCAGUG
25	7532	ACACUGGA	CUGAUGA	X	GAA	AAUUGCA	UGCAAUUUA	UCCAGUGU
	7534	CUACACUG	CUGAUGA	X	GAA	AUAAUUUG	CAAUUUAUC	CAGUGUAG
	7541	AAUAUAUC	CUGAUGA	X	GAA	ACACUGGA	UCCAGUGUA	GAUAUAUU
	7545	GUCAAUAU	CUGAUGA	X	GAA	AUCUACAC	GUGUAGUAU	UAUUUGAC
	7547	UGGUCAAA	CUGAUGA	X	GAA	AUAUCUAC	GUAGAUUAU	UUUGACCA
30	7549	GAUGGUCA	CUGAUGA	X	GAA	AUAUAUCU	AGAUUAUAU	UGACCAUC
	7550	UGAUGGUC	CUGAUGA	X	GAA	AAUAUAUC	GAUAUAUUU	GACCAUCA
	7557	CAUAGGGU	CUGAUGA	X	GAA	AUGGUCAA	UUGACCAUC	ACCCUAUG
	7563	AAUAUCCA	CUGAUGA	X	GAA	AGGGUGAU	AUCACCCUA	UGGAUAUU

	7569	CUAGCCAA	CUGAUGA	X	GAA	AUCCAUAG	CUAUGGAUA	UUGGCUAG
	7571	AACUAGCC	CUGAUGA	X	GAA	AUAUCCAU	AUGGAUAUU	GGCUAGUU
	7576	GGCAAAAC	CUGAUGA	X	GAA	AGCCAAUA	UAUUGGCUA	GUUUUGCC
	7579	AAAGGCAA	CUGAUGA	X	GAA	ACUAGCCA	UGGCUAGUU	UUGCCUUU
5	7580	UAAAGGCA	CUGAUGA	X	GAA	AACUAGCC	GGCUAGUUU	UGCCUUUA
	7581	AUAAAGGC	CUGAUGA	X	GAA	AAACUAGC	GCUAGUUUU	GCCUUUAU
	7586	GCUUAAUA	CUGAUGA	X	GAA	AGGCAAAA	UUUUGCCUU	UAUUAAGC
	7587	UGCUIAAU	CUGAUGA	X	GAA	AAGGCAAA	UUUGCCUUU	AUUAAGCA
	7588	UUGCUIAA	CUGAUGA	X	GAA	AAAGGCAA	UUGCCUUUA	UUAAGCAA
10	7590	AUUUGCUU	CUGAUGA	X	GAA	AUAAAGGC	GCCUUUAUU	AAGCAAAU
	7591	AAUUUGCU	CUGAUGA	X	GAA	AAUAAAGG	CCUUUAUUA	AGCAAUUU
	7599	CUGAAAUG	CUGAUGA	X	GAA	AUUUGCUU	AAGCAAAUU	CAUUUCAG
	7600	GCUGAAAU	CUGAUGA	X	GAA	AAUUUGCU	AGCAAUUUC	AUUUCAGC
	7603	CAGGCUGA	CUGAUGA	X	GAA	AUGAAUUU	AAAUUCAUU	UCAGCCUG
15	7604	UCAGGCUG	CUGAUGA	X	GAA	AAUGAAUU	AAUUCAUUU	CAGCCUGA
	7605	UUCAGGCU	CUGAUGA	X	GAA	AAAUGAAU	AUUCAUUUC	AGCCUGAA
	7617	UAUAGGCA	CUGAUGA	X	GAA	ACAUUCAG	CUGAAGUC	UGCCUAUA
	7623	AGAAUAUA	CUGAUGA	X	GAA	AGGCAGAC	GUCUGCCUA	UAUAUUUC
	7625	AGAGAAUA	CUGAUGA	X	GAA	AUAGGCAG	CUGCCUAUA	UAUUCUCU
20	7627	GCAGAGAA	CUGAUGA	X	GAA	AUAUAGGC	GCCUAUAUA	UUCUCUGC
	7629	GAGCAGAG	CUGAUGA	X	GAA	AUAUAUAG	CUAUAUAUU	CUCUGCUC
	7630	AGAGCAGA	CUGAUGA	X	GAA	AAUAUAUA	UAUAUAUUC	UCUGCUCU
	7632	AAAGAGCA	CUGAUGA	X	GAA	AGAAUAUA	UAUAUUCUC	UGCUCUUU
	7637	AAUACAAA	CUGAUGA	X	GAA	AGCAGAGA	UCUCUGCUC	UUUGUAUU
25	7639	AGAAUACA	CUGAUGA	X	GAA	AGAGCAGA	UCUGCUCUU	UGUAUUUCU
	7640	GAGAAUAC	CUGAUGA	X	GAA	AAGAGCAG	CUGCUCUUU	GUUUUCUC
	7643	AAGGAGAA	CUGAUGA	X	GAA	ACAAAGAG	CUCUUUGUA	UUCUCCUU
	7645	CAAAGGAG	CUGAUGA	X	GAA	AUACAAAG	CUUUGUAUU	CUCCUUUG
	7646	UCAAAGGA	CUGAUGA	X	GAA	AAUACAAA	UUUGUAUUC	UCCUUUGA
30	7648	GUUCAAG	CUGAUGA	X	GAA	AGAAUACA	UGUAUUCUC	CUUUGAAC
	7651	CGGGUUCA	CUGAUGA	X	GAA	AGGAGAAU	AUUCUCCUU	UGAACCCG
	7652	ACGGGUUC	CUGAUGA	X	GAA	AAGGAGAA	UUCUCCUUU	GAACCCGU
	7661	GAUGUUUU	CUGAUGA	X	GAA	ACGGGUUC	GAACCCGUU	AAAACAUC

7662 GGAUGUUU CUGAUGA X GAA AACGGGUU AACCCGUUA AAACAUC

7669 UGCCACAG CUGAUGA X GAA AUGUUUUA UAAAACAUC CUGUGGCA

Where "X" represents stem II region of a HH ribozyme (Hertel et al., 1992 *Nucleic Acids Res.* 20 3252). The length of stem II
5 may be ≥ 2 base-pairs.

Table III: Human *flt1* VEGF Receptor-Hairpin Ribozyme and Substrate Sequence

nt.		HP Ribozyme Sequence		Substrate	
Position					
5	16	CGGGGAGG	AGAA GAGAGG ACCAGAGAAACACACGUGUGUGGUACAUAUACCUUGUA	CCUCUCG	GCU CCUCCCCG
	39	CCGCUCCG	AGAA GCCGCC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUUGUA	GGCGGCG	GCU CGGAGCGG
	180	CCGCCAGA	AGAA GUCCUC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUUGUA	GAGGACG	GAC UCUGGCGG
	190	AACGACCC	AGAA GCCAGA ACCAGAGAAACACACGUGUGUGGUACAUAUACCUUGUA	UCUGGCG	GCC GGGUCGUU
	278	GCGCGCAC	AGAA GGACCC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUUGUA	GGGUCCU	GCU GUGCGCGC
10	290	GACAGCUG	AGAA GCGCGC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUUGUA	GCGGCGU	GCU CAGCUGUC
	295	AAGCAGAC	AGAA GAGCAG ACCAGAGAAACACACGUGUGUGGUACAUAUACCUUGUA	CUGCUCA	GCU GUCUGCUU
	298	GAGAAGCA	AGAA GCUGAG ACCAGAGAAACACACGUGUGUGGUACAUAUACCUUGUA	CUCAGCU	GUC UGCUUCUC
	302	CUGUGAGA	AGAA GACAGC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUUGUA	GCUGUCU	GCU UCUCACAG
	420	CAUUUAUG	AGAA GCUUCC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUUGUA	GGAAAGCA	GCC CAUAAAUG
15	486	CUUCCACA	AGAA GAUUUA ACCAGAGAAACACACGUGUGUGGUACAUAUACCUUGUA	UAAAUCU	GCC UGUGGAAG
	537	UUUGCUUG	AGAA GUGUUC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUUGUA	GAACACA	GCU CAAGCAAA
	565	AUAUUUGC	AGAA GUAGAA ACCAGAGAAACACACGUGUGUGGUACAUAUACCUUGUA	UUCUACA	GCU GCAAAUAU
	721	CGUAACCC	AGAA GGGAAU ACCAGAGAAACACACGUGUGUGGUACAUAUACCUUGUA	AUUCUUU	GCC GGGUUACG
	786	CGUUUUCU	AGAA GGGUUC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUUGUA	GAUCCCU	GAU GGAAAAACG
	863	CUUCACAG	AGAA GAAGCC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUUGUA	GGCUUCU	GAC CUGUGAAG

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1056	UUUUUUUC	AGAA	GGGUAA	ACCAGAGAAACACACG	UUUGUGGUACAUUACCUGGUA	UUACCCU	GAU	GAATAAAA
1301	GCCGGUAA	AGAA	GCUUGC	ACCAGAGAAACACACG	UUUGUGGUACAUUACCUGGUA	GCAAGCG	GUC	UUACCGGC
1310	UCAUAGAG	AGAA	GGUAAG	ACCAGAGAAACACACG	UUUGUGGUACAUUACCUGGUA	CUUACCG	GCU	CUCUAUGA
1389	AAAUAGCG	AGAA	GAUUUC	ACCAGAGAAACACACG	UUUGUGGUACAUUACCUGGUA	GAAAUUC	GCU	CGCUAUUU
5 1535	UUUCGUAA	AGAA	GGGUU	ACCAGAGAAACACACG	UUUGUGGUACAUUACCUGGUA	AACCCCA	GAU	UUACGAAA
1566	AGAGCCGG	AGAA	GGAAAC	ACCAGAGAAACACACG	UUUGUGGUACAUUACCUGGUA	GUUUCCA	GAC	CCGGCUCU
1572	GGGUAGAG	AGAA	GGGUCU	ACCAGAGAAACACACG	UUUGUGGUACAUUACCUGGUA	AGACCCG	GCU	CUCUACCC
1604	CGGUACAA	AGAA	GGAUUU	ACCAGAGAAACACACG	UUUGUGGUACAUUACCUGGUA	AAAUCCU	GAC	UUGUACCG
1824	AUUCUAGA	AGAA	GCCACA	ACCAGAGAAACACACG	UUUGUGGUACAUUACCUGGUA	UGUGGCU	GAC	UCUAGAAU
10 1908	UUUGGCAC	AGAA	GUGAUA	ACCAGAGAAACACACG	UUUGUGGUACAUUACCUGGUA	UAUCACA	GAU	GUGCCAAA
1949	CUCCUUC	AGAA	GCAUUU	ACCAGAGAAACACACG	UUUGUGGUACAUUACCUGGUA	AAAUGCC	GAC	GGAAGGAG
1973	CUGUGCAA	AGAA	GUUUCA	ACCAGAGAAACACACG	UUUGUGGUACAUUACCUGGUA	UGAAACU	GUC	UUGCACAG
2275	AGUGGUGG	AGAA	GCUGAU	ACCAGAGAAACACACG	UUUGUGGUACAUUACCUGGUA	AUCAGCA	GUU	CCACCACU
2321	ACCAAGUG	AGAA	GAGGCU	ACCAGAGAAACACACG	UUUGUGGUACAUUACCUGGUA	AGCCUCA	GAU	CACUUGGU
15 2396	UUUCAUAU	AGAA	GCGUGC	ACCAGAGAAACACACG	UUUGUGGUACAUUACCUGGUA	GCACGCU	GUU	UAUUGAAA
2490	GUUCCUUG	AGAA	GUGAGG	ACCAGAGAAACACACG	UUUGUGGUACAUUACCUGGUA	CCUCACU	GUU	CAAGGAAC
2525	UUAGAGUG	AGAA	GCUCCA	ACCAGAGAAACACACG	UUUGUGGUACAUUACCUGGUA	UGGAGCU	GAU	CACUCUAA
2625	GAUAGGUA	AGAA	GUCUUU	ACCAGAGAAACACACG	UUUGUGGUACAUUACCUGGUA	AAAGACU	GAC	UACCUAUC
2652	GGAACUUC	AGAA	GGGUCC	ACCAGAGAAACACACG	UUUGUGGUACAUUACCUGGUA	GGACCCA	GAU	GAAGUUCC

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2684	CAUAAGGG AGAA GCUCAC ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	GUGAGCG GCU CCCUUAUG
2816	CAGCCACA AGAA GGCACG ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	CGUGCCG GAC UGUGGCUG
2873	GCUCAGUC AGAA GAGCUU ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	AAGCUCU GAU GACUGAGC
2930	AGGCUCCC AGAA GGUUAA ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	UUAAACCU GCU GGGAGCCU
5 2963	CAAUACCC AGAA GAGGCC ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	GGCCUCU GAU GGUGAUUG
3157	UUCUGAA AGAA GGAGCU ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	AGCUCCG GCU UUCAGGAA
3207	UAGAAACC AGAA GAAUCC ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	GGAUUCU GAC GGUUUCUA
3211	CUUGUAGA AGAA GUCAGA ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	UCUGACG GUU UCUACAAG
3245	UGUAAGAA AGAA GAUCUU ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	AAGAUCU GAU UUCUUAUA
10 3256	CACUUGAA AGAA GUAAGA ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	UCUUACA GUU UUCAAGUG
3287	UUCUGGAA AGAA GGAACU ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	AGUUCCU GUC UUCCAGAA
3402	CUCACAUU AGAA GGGUUC ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	GAACCCC GAU UAUGUGAG
3580	CCUCAGGC AGAA GCAAAA ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	UUUUGCA GUC GCCUGAGG
3641	CCAGCAUG AGAA GAUAGA ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	UCUAUCA GAU CAUGCUGG
15 3655	UCUGUGCC AGAA GUCCAG ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	CUGGACU GCU GGCACAGA
3810	UCAGAGAA AGAA GGAGUU ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	AACUCCU GCC UUCUCUGA
3846	AACUUCGG AGAA GAAAUU ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	UAUUUCA GCU CCGAAGUU
3873	CUGACAUC AGAA GAGCUU ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	AAGCUCU GAU GAUGUCAG
3995	GAGAGGCC AGAA GAGUGC ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	GCACUCU GUU GGCCUCUC

4100	UGACAUCA	AGAA	GCCCCG	ACCAGAGAAA	CACACG	UUGUGGUACA	UAUACCU	CGGGGCU	GUC	UGAUGUCA
4104	CUGCUGAC	AGAA	GACAGC	ACCAGAGAAA	CACACG	UUGUGGUACA	UAUACCU	GCUGUCU	GAU	GUCAGCAG
4120	AUGGCAGA	AGAA	GGGCUU	ACCAGAGAAA	CACACG	UUGUGGUACA	UAUACCU	AGGCCCA	GUU	UCUGCCAU
4135	GUGCCAC	AGAA	GGAAUG	ACCAGAGAAA	CACACG	UUGUGGUACA	UAUACCU	CAUUGCA	GCU	GUGGGCAC
5 4210	GGGCGGG	AGAA	GCACGC	ACCAGAGAAA	CACACG	UUGUGGUACA	UAUACCU	GCUGUCU	GCU	CCCCGCCC
4217	AGUCUGG	AGAA	GGGAGC	ACCAGAGAAA	CACACG	UUGUGGUACA	UAUACCU	GCUCUCCC	GCC	CCCAGACU
4224	GAGUUGUA	AGAA	GGGGC	ACCAGAGAAA	CACACG	UUGUGGUACA	UAUACCU	GCCCCCA	GAC	UACAAUCU
4382	CAAAAAGC	AGAA	GGCUCC	ACCAGAGAAA	CACACG	UUGUGGUACA	UAUACCU	GGAGCCA	GCU	GUUUUUUG
4385	UCACAAA	AGAA	GCUGGC	ACCAGAGAAA	CACACG	UUGUGGUACA	UAUACCU	GCCAGCU	GCU	UUUUGUGA
10 4537	GGGUUGG	AGAA	GGGAG	ACCAGAGAAA	CACACG	UUGUGGUACA	UAUACCU	CUUCCCU	GCU	CCAAACCCC
4573	CUCAAUCA	AGAA	GGUCCU	ACCAGAGAAA	CACACG	UUGUGGUACA	UAUACCU	AGGACCA	GUU	UGAUTUGAG
4594	AUUGGGUG	AGAA	GUGCAG	ACCAGAGAAA	CACACG	UUGUGGUACA	UAUACCU	CUGCACU	GAU	CACCCAAU
4628	GGCUGCAG	AGAA	GGCCCA	ACCAGAGAAA	CACACG	UUGUGGUACA	UAUACCU	UGGGCCA	GCC	CUGCAGCC
4636	GGUUUUUG	AGAA	GCAGGG	ACCAGAGAAA	CACACG	UUGUGGUACA	UAUACCU	CCCUGCA	GCC	CAAAAACCC
15 4866	AGGUUCAG	AGAA	GGGAG	ACCAGAGAAA	CACACG	UUGUGGUACA	UAUACCU	CUUCCCA	GCU	CUGACCCU
4871	GUAGAAGG	AGAA	GAGCUG	ACCAGAGAAA	CACACG	UUGUGGUACA	UAUACCU	CAGCUCU	GAC	CCUUCUAC
4905	CGCUGUCC	AGAA	GUCCU	ACCAGAGAAA	CACACG	UUGUGGUACA	UAUACCU	AGGAGCA	GAU	GGACAGCG
5233	CUGUGCAA	AGAA	GAAUAA	ACCAGAGAAA	CACACG	UUGUGGUACA	UAUACCU	UUUUUCU	GUU	UUGCACAG
5281	CUCCUCAG	AGAA	GCAUUU	ACCAGAGAAA	CACACG	UUGUGGUACA	UAUACCU	AAAUGCA	GUC	CUGAGGAG

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5319	UUUCCUCC	AGAA	GCCUC	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	GAGGCU	GAU	GGAGAAA
5358	GGUAUAGA	AGAA	GGUCU	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	AGACCC	GUC	UCUAUACC
5392	UGGGUCCC	AGAA	GUGUG	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	CAACACA	GUU	GGGACCCA
5563	UGAGUCCC	AGAA	GGAGAA	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	UUCUCCA	GUU	GGGACUCA
5622	AGUUUCA	AGAA	GUUGAA	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	UUCAAACU	GCU	UUGAAACU
5738	UAGCAUCA	AGAA	GAGCCA	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	UGGCUCU	GUU	UGAUGCUA
5838	UAGCAUCA	AGAA	GAGCCA	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	UGGCUCU	GUU	UGAUGCUA
5933	CCCCAAGA	AGAA	GCAAUC	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	GAUUGCU	GCU	UCUUGGGG
6022	CACAUAG	AGAA	GAGGCA	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	UGCCUCU	GUU	CUUAUGUG
6120	UCCACAAA	AGAA	GCUGCC	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	GGCAGCG	GCU	UUUGUGGA
6163	GUUGAGAG	AGAA	GUCCCA	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	UGGGACA	GUC	CUCUCCAC
6270	AAAUUGCC	AGAA	GUCACA	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	UGUGACA	GCU	GGCAAUUU
6412	AAGACAUG	AGAA	GCUAAG	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	CUUAGCU	GUU	CAUGUCUU
6511	UUUGAAGG	AGAA	GAGUAA	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	UUACUCA	GCU	CCUUCAAA
6778	UCCACCCA	AGAA	GUUCCA	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	UGGAACA	GUC	UGGGUGGA
6826	ACUUCUUG	AGAA	GACAAG	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	CUUGUCA	GUC	CAAGAAGU
7245	AACAUAAA	AGAA	GUUGCC	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	GGCAACU	GCU	UUUAUGUU
7258	UGGAAGGA	AGAA	GAACAU	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	AUGUUCU	GUC	UCCUCCCA
7433	CCCAUACA	AGAA	GCUAAA	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	UUUAGCU	GAU	UGUAUGGG

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7512	UUUUC AUG AGAA GGAAUU ACCAGAGAAACACACGUGUGUGGUACAUUACCUGGUA	AAUUCU GUC CAUGAAAA
7606	GACAUUCA AGAA GAA AUG ACCAGAGAAACACACGUGUGUGGUACAUUACCUGGUA	CAUUUCA GCC UGAAUGUC
7618	AAUUAUA AGAA GACAUU ACCAGAGAAACACACGUGUGUGGUACAUUACCUGGUA	AAUGUCU GCC UAUUAUUAU
7633	AUACAAAG AGAA GAGAAU ACCAGAGAAACACACGUGUGUGGUACAUUACCUGGUA	AUUCUCU GCU CUUUGUAU

Table IV: Human KDR VEGF Receptor-Hammerhead Ribozyme and Substrate Sequence

	nt. Posi- tion	HH Ribozyme Sequence	Substrate
5	21	CACAGGGC CUGAUGA X GAA ACGGCCAG	CUGGCCGUC GCCCUGUG
	33	UCCACGCA CUGAUGA X GAA AGCCACAG	CUGUGGCUC UGCGUGGA
	56	AACCCACA CUGAUGA X GAA AGGCGGCC	GGCCGCCUC UGUGGGUU
	64	ACUAGGCA CUGAUGA X GAA ACCCACAG	CUGUGGGUU UGCCUAGU
10	65	CACUAGGC CUGAUGA X GAA AACCCACA	UGUGGGUUU GCCUAGUG
	70	AGAAACAC CUGAUGA X GAA AGGCAAAC	GUUUGCCUA GUGUUUCU
	75	UCAAGAGA CUGAUGA X GAA ACACUAGG	CCUAGUGUU UCUCUUGA
	76	AUCAAGAG CUGAUGA X GAA AACACUAG	CUAGUGUUU CUCUUGAU
	77	GAUCAAGA CUGAUGA X GAA AAACACUA	UAGUGUUUC UCUGAUC
15	79	CAGAUCAA CUGAUGA X GAA AGAAACAC	GUGUUUCUC UUGAUCUG
	81	GGCAGAUC CUGAUGA X GAA AGAGAAAC	GUUUCUCUU GAUCUGCC
	85	CCUGGGCA CUGAUGA X GAA AUCAAGAG	CUCUUGAUC UGCCCAGG
	96	UGUAUGCU CUGAUGA X GAA AGCCUGGG	CCCAGGCUC AGCAUACA
	102	UCUUUUUG CUGAUGA X GAA AUGCUGAG	CUCAGCAUA CAAAAAGA
20	114	AUUGUAAG CUGAUGA X GAA AUGUCUUU	AAAGACAUU CUUACAAU
	117	UUAAUUGU CUGAUGA X GAA AGUAUGUC	GACAUACUU ACAAUUAA
	118	CUUAAUUG CUGAUGA X GAA AAGUAUGU	ACAUACUUA CAAUUAAG
	123	UUAGCCUU CUGAUGA X GAA AUUGUAAG	CUUACAAUU AAGGCUAA
	124	AUUAGCCU CUGAUGA X GAA AAUUGUAA	UUACAAUUA AGGCUAAU
25	130	AGUUGUAU CUGAUGA X GAA AGCCUUAU	UUAAGGCUA AUACAACU
	133	AAGAGUUG CUGAUGA X GAA AUUAGCCU	AGGCUAAUA CAACUCUU
	139	AAUUUGAA CUGAUGA X GAA AGUUGUAU	AUACAACUC UUCAAAUU
	141	GUAAUUUG CUGAUGA X GAA AGAGUUGU	ACAACUCUU CAAAUUAC
	142	AGUAAUUU CUGAUGA X GAA AAGAGUUG	CAACUCUUC AAAUUAUC
30	147	CUGCAAGU CUGAUGA X GAA AUUUGAAG	CUUCAAAUU ACUUGCAG
	148	CCUGCAAG CUGAUGA X GAA AAUUGAAG	UUCAAAUUA CUUGCAGG
	151	UCCCCUGC CUGAUGA X GAA AGUAAUUU	AAAUUACUU GCAGGGGA

	170	GCCAGUCC	CUGAUGA	X	GAA	AGUCCCTUC	GAGGGACUU	GGACUGGC
	180	UUGGGCCA	CUGAUGA	X	GAA	AGCCAGUC	GACUGGCUU	UGGCCCAA
	181	AUUGGGCC	CUGAUGA	X	GAA	AAGCCAGU	ACUGGCUUU	GGCCCAAU
	190	ACUCUGAU	CUGAUGA	X	GAA	AUUGGGCC	GGCCCAAUA	AUCAGAGU
5	193	GCCACUCU	CUGAUGA	X	GAA	AUUAUUGG	CCAAUAAUC	AGAGUGGC
	243	UUACAGAA	CUGAUGA	X	GAA	AGGCCAUC	GAUGGCCUC	UUCUGUAA
	245	UCUUACAG	CUGAUGA	X	GAA	AGAGGCCA	UGGCTUCUU	CUGUAAGA
	246	GUCUUACA	CUGAUGA	X	GAA	AAGAGGCC	GGCCUCUUC	UGUAAGAC
	250	GAGUGUCU	CUGAUGA	X	GAA	ACAGAAGA	UCUUCUGUA	AGACACUC
10	258	GGAAUUGU	CUGAUGA	X	GAA	AGUGUCUU	AAGACACUC	ACAAUUCC
	264	ACUUUUGG	CUGAUGA	X	GAA	AUUGUGAG	CUCACAAUU	CCAAAAGU
	265	CACUUUUG	CUGAUGA	X	GAA	AAUUGUGA	UCACAAUUC	CAAAAGUG
	276	UCAUUUCC	CUGAUGA	X	GAA	AUCACUUU	AAAGUGAUC	GGAAUAGA
	296	AGCACUUG	CUGAUGA	X	GAA	AGGCUCCA	UGGAGCCUA	CAAGUGCU
15	305	CCCGGUAG	CUGAUGA	X	GAA	AGCACUUG	CAAGUGCUU	CUACCGGG
	306	UCCCGGUA	CUGAUGA	X	GAA	AAGCACUU	AAGUGCUUC	UACCGGGA
	308	UUUCCCGG	CUGAUGA	X	GAA	AGAAGCAC	GUGCUUCUA	CCGGGAAA
	323	CCGAGGCC	CUGAUGA	X	GAA	AGUCAGUU	AACUGACUU	GGCCUCGG
	329	AAAUGACC	CUGAUGA	X	GAA	AGGCCAAG	CUUGGCCUC	GGUCAUUU
20	333	ACAUAAAU	CUGAUGA	X	GAA	ACCGAGGC	GCCUCGGUC	AUUUAUGU
	336	UAGACAU	CUGAUGA	X	GAA	AUGACCGA	UCGGUCAUU	UAUGUCUA
	337	AUAGACAU	CUGAUGA	X	GAA	AAUGACCG	CGGUCAUUU	AUGUCUAU
	338	CAUAGACA	CUGAUGA	X	GAA	AAAUGACC	GGUCAUUUA	UGUCUAUG
	342	UGAACAU	CUGAUGA	X	GAA	ACAUAAAU	AUUUAUGUC	UAUGUUA
25	344	CUUGAACA	CUGAUGA	X	GAA	AGACAUAA	UUAUGUCUA	UGUUCAAG
	348	UAAUCUUG	CUGAUGA	X	GAA	ACAUAGAC	GUCUAUGUU	CAAGAUUA
	349	GUAAUCUU	CUGAUGA	X	GAA	AACAUAGA	UCUAUGUUC	AAGAUUAC
	355	AGAUCUGU	CUGAUGA	X	GAA	AUCUUGAA	UUCAAGAUU	ACAGAUCU
	356	GAGAUCTG	CUGAUGA	X	GAA	AAUCUUGA	UCAAGAUUA	CAGAUCUC
30	362	UAAAUGGA	CUGAUGA	X	GAA	AUCUGUAA	UUACAGAU	UCCAUUUA
	364	AAUAAAUG	CUGAUGA	X	GAA	AGAUCUGU	ACAGAUCUC	CAUUUAUU
	368	AAGCAAUA	CUGAUGA	X	GAA	AUGGAGAU	AUCUCCAUU	UAUUGCUU
	369	GAAGCAAU	CUGAUGA	X	GAA	AAUGGAGA	UCUCCAUUU	AUUGCUUC

370	AGAAGCAA	CUGAUGA	X	GAA	AAAUGGAG	CUCCAUUUA	UUGCUCUCU	
372	ACAGAAGC	CUGAUGA	X	GAA	AUAAAUGG	CCAUUUAUU	GCUUCUGU	
376	ACUAACAG	CUGAUGA	X	GAA	AGCAAUAA	UUAUUGCUU	CUGUUAGU	
377	CACUAACA	CUGAUGA	X	GAA	AAGCAAUA	UAUUGCUUC	UGUUAGUG	
5	381	UGGUCACU	CUGAUGA	X	GAA	ACAGAAGC	GCUUCUGUU	AGUGACCA
382	UUGGUCAC	CUGAUGA	X	GAA	AACAGAAG	CUUCUGUUA	GUGACCAA	
399	AUGUACAC	CUGAUGA	X	GAA	ACUCCAUG	CAUGGAGUC	GUGUACAU	
404	CAGUAAUG	CUGAUGA	X	GAA	ACACGACU	AGUCGUGUA	CAUUACUG	
408	UUCUCAGU	CUGAUGA	X	GAA	AUGUACAC	GUGUACAUU	ACUGAGAA	
10	409	GUUCUCAG	CUGAUGA	X	GAA	AAUGUACA	UGUACAUUA	CUGAGAAC
438	AGACAUGG	CUGAUGA	X	GAA	AUCACCAC	GUGGUGAUU	CCAUGUCU	
439	GAGACAUG	CUGAUGA	X	GAA	AAUCACCA	UGGUGAUUC	CAUGUCUC	
445	GGACCCGA	CUGAUGA	X	GAA	ACAUGGAA	UUGCAUGUC	UCGGGUCC	
447	AUGGACCC	CUGAUGA	X	GAA	AGACAUGG	CCAUGUCUC	GGGUCCA	
15	452	UUGAAAUG	CUGAUGA	X	GAA	ACCCGAGA	UCUCGGGUC	CAUUUCAA
456	AGAUUGA	CUGAUGA	X	GAA	AUGGACCC	GGGUCCA	UCAAUUCU	
457	GAGAUUUG	CUGAUGA	X	GAA	AAUGGACC	GGUCCA	UUUCAAUCUC	
458	UGAGAUUU	CUGAUGA	X	GAA	AAAUGGAC	GUCCA	UUUCAAUCU	
463	CACGUUGA	CUGAUGA	X	GAA	AUUUGAAA	UUUCAA	AUCUACAUG	
20	465	GACACGUU	CUGAUGA	X	GAA	AGAUUGA	UCAAUUCUC	AACGUGUC
473	CACAAAGU	CUGAUGA	X	GAA	ACACGUUG	CAACGUGUC	ACUUUGUG	
477	CUUGCACA	CUGAUGA	X	GAA	AGUGACAC	GUGUCACUU	UGUGCAAG	
478	UCUUGCAC	CUGAUGA	X	GAA	AAGUGACA	UGUCACUUU	GUGCAAGA	
488	UUUCUGGG	CUGAUGA	X	GAA	AUCUUGCA	UGCAAGAU	CCCAGAAA	
25	503	CAGGAACA	CUGAUGA	X	GAA	AUCUCUUU	AAAGAGAUU	UGUUCUCU
504	UCAGGAAC	CUGAUGA	X	GAA	AAUCUCUU	AAGAGAUUU	GUUCCUGA	
507	CCAUCAGG	CUGAUGA	X	GAA	ACAAAUCU	AGAUUUGUU	CCUGAUGG	
508	ACCAUCAG	CUGAUGA	X	GAA	AACAAAUC	GAUUUGUUC	CUGAUGGU	
517	AAUUCUGU	CUGAUGA	X	GAA	ACCAUCAG	CUGAUGGUA	ACAGAAUU	
30	525	UCCCAGGA	CUGAUGA	X	GAA	AUUCUGUU	AACAGAAUU	UCCUGGGA
526	GUCCCAGG	CUGAUGA	X	GAA	AAUUCUGU	ACAGAAUUU	CCUGGGAC	
527	UGUCCCAG	CUGAUGA	X	GAA	AAAUUCUG	CAGAAUUUC	CUGGGACA	
548	GAAUAGUA	CUGAUGA	X	GAA	AGCCCUUC	GAAGGGCUU	UACUUAUC	

100

	549	GGAAUAGU	CUGAUGA	X	GAA	AAGCCCUU	AAGGGCUUU	ACUAUUCC
	550	GGGAAUAG	CUGAUGA	X	GAA	AAAGCCCU	AGGGCUUUA	CUAUUCCC
	553	GCUGGGAA	CUGAUGA	X	GAA	AGUAAAGC	GCUUUACUA	UUCCCAGC
	555	UAGCUGGG	CUGAUGA	X	GAA	AUAGUAAA	UUUACUAUU	CCCAGCUA
5	556	GUAGCUGG	CUGAUGA	X	GAA	AAUAGUAA	UUACUAUUC	CCAGCUAC
	563	UGAUCAUG	CUGAUGA	X	GAA	AGCUGGGA	UCCCAGCUA	CAUGAUCA
	570	GCAUAGCU	CUGAUGA	X	GAA	AUCAUGUA	UACAUGAUC	AGCUAUGC
	575	UGCCAGCA	CUGAUGA	X	GAA	AGCUGAUC	GAUCAGCUA	UGCUGGCA
	588	UCACAGAA	CUGAUGA	X	GAA	ACCAUGCC	GGCAUGGUC	UUCUGUGA
10	590	CUUCACAG	CUGAUGA	X	GAA	AGACCAUG	CAUGGUCUU	CUGUGAAG
	591	GCUUCACA	CUGAUGA	X	GAA	AAGACCAU	AUGGUCUUC	UGUGAAGC
	606	UCAUCAUU	CUGAUGA	X	GAA	AUUUUUGC	GCAAAAAUU	AAUGAUGA
	607	UUCAUCAU	CUGAUGA	X	GAA	AAUUUUUG	CAAAAAUUA	AUGAUGAA
	619	AGACUGGU	CUGAUGA	X	GAA	ACUUUCAU	AUGAAAGUU	ACCAGUCU
15	620	UAGACUGG	CUGAUGA	X	GAA	AACUUUCA	UGAAAGUUA	CCAGUCUA
	626	ACAUAAUA	CUGAUGA	X	GAA	ACUGGUAA	UUACCAGUC	UAUUANGU
	628	GUACAUAA	CUGAUGA	X	GAA	AGACUGGU	ACCAGUCUA	UUAUGUAC
	630	AUGUACAU	CUGAUGA	X	GAA	AUAGACUG	CAGUCUAUU	AUGUACAU
	631	UAUGUACA	CUGAUGA	X	GAA	AAUAGACU	AGUCUAUUA	UGUACAU
20	635	CAACUAUG	CUGAUGA	X	GAA	ACAUAAUA	UAUUANGUA	CAUAGUUG
	639	ACGACAAC	CUGAUGA	X	GAA	AUGUACAU	AUGUACAU	GUUGUCGU
	642	ACAACGAC	CUGAUGA	X	GAA	ACUAUGUA	UACAUAGUU	GUCGUUGU
	645	CCUACAAC	CUGAUGA	X	GAA	ACAACUUA	AUAGUUGUC	GUUGUAGG
	648	UACCCUAC	CUGAUGA	X	GAA	ACGACAAC	GUUGUCGUU	GUAGGGUA
25	651	CUAUACCC	CUGAUGA	X	GAA	ACAACGAC	GUCGUUGUA	GGGUUAUG
	656	AAAUCCUA	CUGAUGA	X	GAA	ACCCUACA	UGUAGGGUA	UAGGAUUU
	658	AUAAAUCC	CUGAUGA	X	GAA	AUACCCUA	UAGGGUUA	GGAUUUUU
	663	ACAUCAUA	CUGAUGA	X	GAA	AUCCUAUA	UAUAGGAUU	UAUGAUGU
	664	CACAUCAU	CUGAUGA	X	GAA	AAUCCUAU	AUAGGAUUU	AUGAUGUG
30	665	CCACAUCA	CUGAUGA	X	GAA	AAAUCCUA	UAGGAUUUA	UGAUGUGG
	675	GGACUCAG	CUGAUGA	X	GAA	ACCACAUC	GAUGUGGUU	CUGAGUCC
	676	CGGACUCA	CUGAUGA	X	GAA	AACCACAU	AUGUGGUUC	UGAGUCCG
	682	AUGAGACG	CUGAUGA	X	GAA	ACUCAGAA	UUCUGAGUC	CGUCUCAU

686	UUCCAUGA	CUGAUGA	X	GAA	ACGGACUC	GAGUCCGUC	UCAUGGAA
688	AAUUCCAU	CUGAUGA	X	GAA	AGACGGAC	GUCCGUCUC	AUGGAAUU
696	GAUAGUUC	CUGAUGA	X	GAA	AUUCCAUG	CAUGGAAUU	GAACUAUC
702	CCAACAGA	CUGAUGA	X	GAA	AGUUCAAU	AUUGAACUA	UCUGUUGG
5 704	CUCCAACA	CUGAUGA	X	GAA	AUAGUUCA	UGAACUAUC	UGUUGGAG
708	UUUUCUCC	CUGAUGA	X	GAA	ACAGAUAG	CUAUCUGUU	GGAGAAAA
720	UUUAAGAC	CUGAUGA	X	GAA	AGCUUUUC	GAAAAGCUU	GUCUUAAA
723	CAAUUUAA	CUGAUGA	X	GAA	ACAAGCUU	AAGCUUGUC	UUAUUUUG
725	UACAAUUU	CUGAUGA	X	GAA	AGACAAGC	GCUUGUCUU	AAAUUGUA
10 726	GUACAAUU	CUGAUGA	X	GAA	AAGACAAG	CUUGUCUUA	AAUUGUAC
730	UGCUGUAC	CUGAUGA	X	GAA	AUUUAAGA	UCUUAAAUU	GUACAGCA
733	UCUUGCUG	CUGAUGA	X	GAA	ACAAUUUA	UAAAUUGUA	CAGCAAGA
750	CCCACAUU	CUGAUGA	X	GAA	AGUUCAGU	ACUGAACUA	AAUGUGGG
762	UUGAAGUC	CUGAUGA	X	GAA	AUCCCCAC	GUGGGGAUU	GACUUCAA
15 767	CCCAGUUG	CUGAUGA	X	GAA	AGUCAAUC	GAUUGACUU	CAACUGGG
768	UCCCAGUU	CUGAUGA	X	GAA	AAGUCAAU	AUUGACUUC	AACUGGGA
779	AAGAAGGG	CUGAUGA	X	GAA	AUUCCCAG	CUGGGAAUA	CCCUUCUU
784	CUUCGAAG	CUGAUGA	X	GAA	AGGGUAUU	AAUACCCUU	CUUCGAAG
785	GCUUCGAA	CUGAUGA	X	GAA	AAGGGUAU	AUACCCUUC	UUCGAAGC
20 787	AUGCUUCG	CUGAUGA	X	GAA	AGAAGGGU	ACCCUUCUU	CGAAGCAU
788	GAUGCUUC	CUGAUGA	X	GAA	AAGAAGGG	CCCUUCUUC	GAAGCAUC
796	CUUAUGCU	CUGAUGA	X	GAA	AUGCUUCG	CGAAGCAUC	AGCAUAAG
802	AAGUUUCU	CUGAUGA	X	GAA	AUGCUGAU	AUCAGCAUA	AGAAACUU
810	CGGUUUAC	CUGAUGA	X	GAA	AGUUUCUU	AAGAAACUU	GUAAACCG
25 813	UCUCGGUU	CUGAUGA	X	GAA	ACAAGUUU	AAACUUGUA	AACCGAGA
825	UGGGUUUU	CUGAUGA	X	GAA	AGGUCUCG	CGAGACCUA	AAAACCCA
836	CACUCCCA	CUGAUGA	X	GAA	ACUGGGUU	AACCCAGUC	UGGGAGUG
857	UGCUCAAA	CUGAUGA	X	GAA	AUUUCUUC	GAAGAAAUU	UUUGAGCA
858	GUGCUCAA	CUGAUGA	X	GAA	AAUUUCUU	AAGAAAUUU	UUGAGCAC
30 859	GGUGCUCA	CUGAUGA	X	GAA	AAAUUUCU	AGAAAUUUU	UGAGCACC
860	AGGUGCUC	CUGAUGA	X	GAA	AAAAUUUC	GAAAUUUUU	GAGCACCU
869	CUAUAGUU	CUGAUGA	X	GAA	AGGUGCUC	GAGCACCUU	AACUAUAG
870	UCUAUAGU	CUGAUGA	X	GAA	AAGGUGCU	AGCACCUUA	ACUAUAGA

	874	ACCAUCUA CUGAUGA X GAA AGUUAAGG	CCUUAACUA UAGAUGGU
	876	ACACCAUC CUGAUGA X GAA AUAGUUA	UUAACUAUA GAUGGUGU
	885	CUCCGGGU CUGAUGA X GAA ACACCAUC	GAUGGUGUA ACCCGGAG
	905	AGGUGUAC CUGAUGA X GAA AUCCUUGG	CCAAGGAUU GUACACCU
5	908	CACAGGUG CUGAUGA X GAA ACAAUCCU	AGGAUUGUA CACCUGUG
	923	GCCCACUG CUGAUGA X GAA AUGCUGCA	UGCAGCAUC CAGUGGGC
	956	CCCUGACA CUGAUGA X GAA AUGUGCUG	CAGCACAUU UGUCAGGG
	957	ACCCUGAC CUGAUGA X GAA AAUGUGCU	AGCACAUUU GUCAGGGU
	960	UGGACCCU CUGAUGA X GAA ACAAUUGU	ACAUUUGUC AGGGUCCA
10	966	UUUUCAUG CUGAUGA X GAA ACCCUGAC	GUCAGGGUC CAUGAAAA
	979	AGCAACA CUGAUGA X GAA AGGUUUU	AAAAACCUU UUGUUGCU
	980	AAGCAACA CUGAUGA X GAA AAGGUUU	AAAACCUU UGUUGCUU
	981	AAAGCAAC CUGAUGA X GAA AAAGGUU	AAACCUUU GUUGCUUU
	984	CCAAAAGC CUGAUGA X GAA ACAAAGG	CCUUUUGU GCUUUUGG
15	988	ACUUCCAA CUGAUGA X GAA AGCAACA	UUGUUGCUU UUGGAAGU
	989	CACUCCA CUGAUGA X GAA AAGCAACA	UGUUGCUU UGGAAGUG
	990	CCACUCC CUGAUGA X GAA AAAGCAAC	GUUGCUUU GGAAGUGG
	1007	CCACCAGA CUGAUGA X GAA AUUCCAUG	CAUGGAUUC UCUGGUGG
	1009	UUCCACCA CUGAUGA X GAA AGAUCCA	UGGAUUCUC UGGUGGAA
20	1038	GGGAUUCU CUGAUGA X GAA ACACGCUC	GAGCGUGUC AGAAUCCC
	1044	UUCGCAGG CUGAUGA X GAA AUUCUGAC	GUCAGAAUC CCUGCGAA
	1055	AACCAAGG CUGAUGA X GAA ACUUCGCA	UGCAGGUA CCUUGGUU
	1059	GGGUAACC CUGAUGA X GAA AGGUACU	AAGUACCUU GGUUACCC
	1063	GGGUGGGU CUGAUGA X GAA ACCAAGGU	ACCUUGGUU ACCCACCC
25	1064	GGGGUGGG CUGAUGA X GAA AACCAAGG	CCUUGGUUA CCCACCCC
	1080	UACCAUUU CUGAUGA X GAA AUUUCUGG	CCAGAAUA AAAUGGUA
	1088	CAUUUUUA CUGAUGA X GAA ACCAUUUU	AAAAUGGUA UAAAAAUG
	1090	UCCAUUUU CUGAUGA X GAA AUACCAU	AAUGGUAUA AAAAUGGA
	1101	UCAAGGGG CUGAUGA X GAA AUUCCA	AAUGGAAUA CCCCUGA
30	1107	UUGGACUC CUGAUGA X GAA AGGGGU	AUACCCCU GAGUCCAA
	1112	UGUGAUUG CUGAUGA X GAA ACUCAAGG	CCUUGAGUC CAAUCACA
	1117	AAUUGUGU CUGAUGA X GAA AUUGGACU	AGUCCAAUC ACACAAU
	1125	CCCGCUU CUGAUGA X GAA AUUGUGUG	CACACAAU AAAGCGGG

	1126	CCCCGCUU	CUGAUGA	X	GAA	AAUUGUGU	ACACAAUUA	AAGCGGGG
	1140	AUCGUCAG	CUGAUGA	X	GAA	ACAUGCCC	GGGCAUGUA	CUGACGAU
	1149	ACUUCCAU	CUGAUGA	X	GAA	AUCGUCAG	CUGACGAUU	AUGGAAGU
	1150	CACUUCCA	CUGAUGA	X	GAA	AAUCGUCA	UGACGAUUA	UGGAAGUG
5	1180	GACAGUGU	CUGAUGA	X	GAA	AUUUCCUG	CAGGAAAUU	ACACUGUC
	1181	UGACAGUG	CUGAUGA	X	GAA	AAUUUCCU	AGGAAAUUA	CACUGUCA
	1188	GUAAGGAU	CUGAUGA	X	GAA	ACAGUGUA	UACACUGUC	AUCCUUAC
	1191	UUGGUAAG	CUGAUGA	X	GAA	AUGACAGU	ACUGUCAUC	CUUACCAA
	1194	GGAUUGGU	CUGAUGA	X	GAA	AGGAUGAC	GUCAUCCUU	ACCAAUCC
10	1195	GGGAUUGG	CUGAUGA	X	GAA	AAGGAUGA	UCAUCCUUA	CCAAUCCC
	1201	UGAAAUGG	CUGAUGA	X	GAA	AUUGGUAA	UUACCAAUC	CCAUUUCA
	1206	UCCUUUGA	CUGAUGA	X	GAA	AUGGGAUU	AAUCCCAUU	UCAAAGGA
	1207	CUCCUUUG	CUGAUGA	X	GAA	AAUGGGAU	AUCCCAUUU	CAAAGGAG
	1208	UCUCCUUU	CUGAUGA	X	GAA	AAAUGGGA	UCCCAUUUC	AAAGGAGA
15	1233	ACCAGAGA	CUGAUGA	X	GAA	ACCACAUG	CAUGUGGUC	UCUCUGGU
	1235	CAACCAGA	CUGAUGA	X	GAA	AGACCACA	UGUGGUCUC	UCUGGUUG
	1237	CACAACCA	CUGAUGA	X	GAA	AGAGACCA	UGGUCUCUC	UGGUUGUG
	1242	ACAUACAC	CUGAUGA	X	GAA	ACCAGAGA	UCUCUGGUU	GUGUAUGU
	1247	GUGGGACA	CUGAUGA	X	GAA	ACACAACC	GGUUGUGUA	UGUCCCAC
20	1251	UGGGGUGG	CUGAUGA	X	GAA	ACAUACAC	GUGUAUGUC	CCACCCCA
	1263	UUCUCACC	CUGAUGA	X	GAA	AUCUGGGG	CCCCAGAUU	GGUGAGAA
	1274	AGAUUAGA	CUGAUGA	X	GAA	AUUUCUCA	UGAGAAUUC	UCUAAUCU
	1276	AGAGAUUA	CUGAUGA	X	GAA	AGAUUUCU	AGAAAUUCUC	UAAUCUCU
	1278	GGAGAGAU	CUGAUGA	X	GAA	AGAGAUUU	AAAUCUCUA	AUCUCUCC
25	1281	ACAGGAGA	CUGAUGA	X	GAA	AUUAGAGA	UCUCUAAUC	UCUCCUGU
	1283	CCACAGGA	CUGAUGA	X	GAA	AGAUUAGA	UCUAAUCUC	UCCUGUGG
	1285	AUCCACAG	CUGAUGA	X	GAA	AGAGAUUA	UAAUCUCUC	CUGUGGAU
	1294	CUGGUAGG	CUGAUGA	X	GAA	AUCCACAG	CUGUGGAUU	CCUACCAG
	1295	ACUGGUAG	CUGAUGA	X	GAA	AAUCCACA	UGUGGAUUC	CUACCAGU
30	1298	CGUACUGG	CUGAUGA	X	GAA	AGGAAUCC	GGAUUCCUA	CCAGUACG
	1304	UGGUGCCG	CUGAUGA	X	GAA	ACUGGUAG	CUACCAGUA	CGGCACCA
	1315	CAGCGUUU	CUGAUGA	X	GAA	AGUGGUGC	GCACCACUC	AAACGUCG
	1330	AUAGACCG	CUGAUGA	X	GAA	ACAUGUCA	UGACAUGUA	CGGUCUAU

	1335	AUGGCAUA	CUGAUGA	X	GAA	ACCGUACA	UGUACGGUC	UAUGCCAU
	1337	GAAUGGCA	CUGAUGA	X	GAA	AGACCGUA	UACGGUCUA	UGCCAUUC
	1344	GGGGGAGG	CUGAUGA	X	GAA	AUGGCAUA	UAUGCCAUU	CCUCCCCC
	1345	CGGGGGAG	CUGAUGA	X	GAA	AAUGGCAU	AUGCCAUUC	CUCCCCCG
5	1348	AUGCGGGG	CUGAUGA	X	GAA	AGGAAUGG	CCAUUCCUC	CCCCGCAU
	1357	GUGGAUGU	CUGAUGA	X	GAA	AUGCGGGG	CCCCGCAUC	ACAUCCAC
	1362	UACCAGUG	CUGAUGA	X	GAA	AUGUGAUG	CAUCACAUC	CACUGGUA
	1370	ACUGCCAA	CUGAUGA	X	GAA	ACCAGUGG	CCACUGGUA	UUGGCAGU
	1372	CAACUGCC	CUGAUGA	X	GAA	AUACCAGU	ACUGGUUUU	GGCAGUUG
10	1379	CUUCCUCC	CUGAUGA	X	GAA	ACUGCCAA	UUGGCAGUU	GGAGGAAG
	1416	GUCACUGA	CUGAUGA	X	GAA	ACAGCUUG	CAAGCUGUC	UCAGUGAC
	1418	UUGUCACU	CUGAUGA	X	GAA	AGACAGCU	AGCUGUCUC	AGUGACAA
	1433	CACAAGGG	CUGAUGA	X	GAA	AUGGGUUU	AAACCCAUU	CCCUUGUG
	1438	UUCUUCAC	CUGAUGA	X	GAA	AGGGUAUG	CAUACCCUU	GUGAAGAA
15	1466	CUCCCUUG	CUGAUGA	X	GAA	AGUCCUCC	GGAGGACUU	CCAGGGAG
	1467	CCUCCCUUG	CUGAUGA	X	GAA	AAGUCCUC	GAGGACUUC	CAGGGAGG
	1480	UUCAAUUU	CUGAUGA	X	GAA	AUUUCCUC	GAGGAAUAU	AAAUUGAA
	1485	UUAACUUC	CUGAUGA	X	GAA	AUUUUUUU	AAUAAAAUU	GAAGUUAA
	1491	UUUUUAUU	CUGAUGA	X	GAA	ACUUCAAU	AUUGAAGUU	AAUAAAAA
20	1492	AUUUUUAU	CUGAUGA	X	GAA	AACUUCAA	UUGAAGUUA	AUAAAAAU
	1495	UUGAUUUU	CUGAUGA	X	GAA	AUUAACUU	AAGUUAAUA	AAAAUCAU
	1501	AGCAAUUU	CUGAUGA	X	GAA	AUUUUUAU	AUAAAAAUC	AAUUUGCU
	1505	UUAGAGCA	CUGAUGA	X	GAA	AUUGAUUU	AAAUCAAUU	UGCUCUAA
	1506	AUUAGAGC	CUGAUGA	X	GAA	AAUUGAUU	AAUCAAUUU	GCUCUAAU
25	1510	UUCAAUUA	CUGAUGA	X	GAA	AGCAAUUU	AAUUUGCUC	UAAUUGAA
	1512	CCUUCAAU	CUGAUGA	X	GAA	AGAGCAAA	UUUGCUCUA	AUUGAAGG
	1515	UUUCCUUC	CUGAUGA	X	GAA	AUUAGAGC	GCUCUAAUU	GAAGGAAA
	1536	AGGGUACU	CUGAUGA	X	GAA	ACAGUUUU	AAAACUGUA	AGUACCCU
	1540	AACAAGGG	CUGAUGA	X	GAA	ACUUACAG	CUGUAAGUA	CCCUUGUU
30	1545	UGGAUAAC	CUGAUGA	X	GAA	AGGGUACU	AGUACCCUU	GUUAUCCA
	1548	GCUUGGAU	CUGAUGA	X	GAA	ACAAGGGU	ACCCUUGUU	AUCCAAGC
	1549	CGCUUGGA	CUGAUGA	X	GAA	AACAAGGG	CCCUUGUUA	UCCAAGCG
	1551	GCCGCUUG	CUGAUGA	X	GAA	AUAACAAG	CUUGUUAUC	CAAGCGGC

	1568	ACAAAGCU	CUGAUGA	X	GAA	ACACAUUU	AAAUGUGUC	AGCUUUGU
	1573	UUUGUACA	CUGAUGA	X	GAA	AGCUGACA	UGUCAGCUU	UGUACAAA
	1574	AUUUGUAC	CUGAUGA	X	GAA	AAGCUGAC	GUCAGCUUU	GUACAAAU
	1577	CACAUUUG	CUGAUGA	X	GAA	ACAAAGCU	AGCUUUGUA	CAAUGUG
5	1593	ACUUGUUU	CUGAUGA	X	GAA	ACCGCUUC	GAAGCGGUC	AACAAAGU
	1602	CCUCUCCC	CUGAUGA	X	GAA	ACUUGUUU	AACAAAGUC	GGGAGAGG
	1623	UGGAAGGA	CUGAUGA	X	GAA	AUCACCCU	AGGGUGAUC	UCCUCCA
	1625	CGUGGAAG	CUGAUGA	X	GAA	AGAUCACC	GGUGAUCUC	CUUCCACG
	1628	UCACGUGG	CUGAUGA	X	GAA	AGGAGAUC	GAUCUCCUU	CCACGUGA
10	1629	GUCACGUG	CUGAUGA	X	GAA	AAGGAGAU	AUCUCCUUC	CACGUGAC
	1645	AAUUCAG	CUGAUGA	X	GAA	ACCCUGG	CCAGGGGUC	CUGAAAUU
	1653	UGCAAAGU	CUGAUGA	X	GAA	AUUUCAGG	CCUGAAAUU	ACUUGCA
	1654	UUGCAAAG	CUGAUGA	X	GAA	AAUUCAG	CUGAAAUUA	CUUUGCAA
	1657	AGGUUGCA	CUGAUGA	X	GAA	AGUAAUUU	AAAUUACUU	UGCAACCU
15	1658	CAGGUUGC	CUGAUGA	X	GAA	AAGUAAUU	AAUUACUUU	GCAACCUG
	1697	ACCACAAA	CUGAUGA	X	GAA	ACACGCUC	GAGCGUGUC	UUUGUGGU
	1699	GCACCACA	CUGAUGA	X	GAA	AGACACGC	GCGUGUCUU	UGUGGUGC
	1700	UGCACCAC	CUGAUGA	X	GAA	AAGACACG	CGUGUCUUU	GUGGUGCA
	1721	CAAACGUA	CUGAUGA	X	GAA	AUCUGUCU	AGACAGAUC	UACGUUUG
20	1723	CUCAAACG	CUGAUGA	X	GAA	AGAUCUGU	ACAGAUCUA	CGUUGAG
	1727	GGUUCUCA	CUGAUGA	X	GAA	ACGUAGAU	AUCUACGUU	UGAGAACC
	1728	AGGUUCUC	CUGAUGA	X	GAA	AACGUAGA	UCUACGUUU	GAGAACCU
	1737	UACCAUGU	CUGAUGA	X	GAA	AGGUUCUC	GAGAACCUC	ACAUGGUA
	1745	CAAGCUUG	CUGAUGA	X	GAA	ACCAUGUG	CACAUGGUA	CAAGCUUG
25	1752	UGUGGGCC	CUGAUGA	X	GAA	AGCUUGUA	UACAAGCUU	GGCCCACA
	1765	GAUUGGCA	CUGAUGA	X	GAA	AGGCUGUG	CACAGCCUC	UGCCAAUC
	1773	CCCACAUG	CUGAUGA	X	GAA	AUUGGCAG	CUGCCAAUC	CAUGUGGG
	1787	GUGUGGGC	CUGAUGA	X	GAA	ACUCUCCC	GGGAGAGUU	GCCCACAC
	1800	UUCUUGCA	CUGAUGA	X	GAA	ACAGGUGU	ACACCUGUU	UGCAAGAA
30	1801	GUUCUUGC	CUGAUGA	X	GAA	AACAGGUG	CACCUGUUU	GCAAGAAC
	1811	GAGUAUCC	CUGAUGA	X	GAA	AGUUCUUG	CAAGAACUU	GGAUACUC
	1816	CCAAAGAG	CUGAUGA	X	GAA	AUCCAAGU	ACUUGGAUA	CUCUUGG
	1819	UUUCCAAA	CUGAUGA	X	GAA	AGUAUCCA	UGGAUACUC	UUUGGAAA

	1821	AAUJUCCA	CUGAUGA	X	GAA	AGAGUAUC	GAUACUCUU	UGGAAAUU
	1822	CAAUJUCC	CUGAUGA	X	GAA	AAGAGUAU	AUACUCUUU	GGAAAUUG
	1829	UGGCAUUC	CUGAUGA	X	GAA	AUUUCCAA	UUGGAAAUU	GAAUGCCA
	1844	UAUJAGAG	CUGAUGA	X	GAA	ACAUGGUG	CACCAUGUU	CUCUAAUA
5	1845	CUAJUAGA	CUGAUGA	X	GAA	AACAUGGU	ACCAUGUUC	UCUAAUAG
	1847	UGCUAUUA	CUGAUGA	X	GAA	AGAACAUG	CAUGUUCUC	UAAUAGCA
	1849	UGUGCUAU	CUGAUGA	X	GAA	AGAGAACA	UGUUCUCUA	AUAGCACA
	1852	AUUUGUGC	CUGAUGA	X	GAA	AUUAGAGA	UCUCUAAUA	GCACAAAU
	1866	AUGAUCAA	CUGAUGA	X	GAA	AUGUCAUU	AAUGACAUU	UUGAUCAU
10	1867	CAUGAUCA	CUGAUGA	X	GAA	AAUGUCAU	AUGACAUUU	UGAUCAUG
	1868	CCAUGAUC	CUGAUGA	X	GAA	AAAUGUCA	UGACAUUUU	GAUCAUGG
	1872	AGCUCCAU	CUGAUGA	X	GAA	AUCAAAAU	AUUUUGAUC	AUGGAGCU
	1881	GCAUUCUU	CUGAUGA	X	GAA	AGCUCCAU	AUGGAGCUU	AAGAAUGC
	1882	UGCAUUCU	CUGAUGA	X	GAA	AAGCUCCA	UGGAGCUUA	AGAAUGCA
15	1892	CCUGCAAG	CUGAUGA	X	GAA	AUGCAUUC	GAAUGCAUC	CUUGCAGG
	1895	GGUCCUGC	CUGAUGA	X	GAA	AGGAUGCA	UGCAUCCUU	GCAGGACC
	1913	GGCAGACA	CUGAUGA	X	GAA	AGUCUCCU	AGGAGACUA	UGUCUGCC
	1917	GCAAGGCA	CUGAUGA	X	GAA	ACAUAGUC	GACUAUGUC	UGCCUUGC
	1923	UCUUGAGC	CUGAUGA	X	GAA	AGGCAGAC	GUCUGCCUU	GCUCAAGA
20	1927	CCUGUCUU	CUGAUGA	X	GAA	AGCAAGGC	GCCUUGCUC	AAGACAGG
	1954	GACCACGC	CUGAUGA	X	GAA	AUGUCUUU	AAAGACAUU	GCGUGGUC
	1962	AGCUGCCU	CUGAUGA	X	GAA	ACCACGCA	UGCGUGGUC	AGGCAGCU
	1971	AGGACUGU	CUGAUGA	X	GAA	AGCUGCCU	AGGCAGCUC	ACAGUCCU
	1977	CGCUCUAG	CUGAUGA	X	GAA	ACUGUGAG	CUCACAGUC	CUAGAGCG
25	1980	ACACGCUC	CUGAUGA	X	GAA	AGGACUGU	ACAGUCCUA	GAGCGUGU
	2001	UUUCCUGU	CUGAUGA	X	GAA	AUCGUGGG	CCCACGAUC	ACAGGAAA
	2020	UGUCGUCU	CUGAUGA	X	GAA	AUUCUCCA	UGGAGAAUC	AGACGACA
	2032	UUCCCCAA	CUGAUGA	X	GAA	ACUUGUCG	CGACAAGUA	UUGGGGAA
	2034	CUUUCCCC	CUGAUGA	X	GAA	AUACUUGU	ACAAGUAUU	GGGGAAAG
30	2046	GAGACUUC	CUGAUGA	X	GAA	AUGCUUUC	GAAAGCAUC	GAAGUCUC
	2052	GUGCAUGA	CUGAUGA	X	GAA	ACUUCGAU	AUCGAAGUC	UCAUGCAC
	2054	CCGUGCAU	CUGAUGA	X	GAA	AGACUUCG	CGAAGUCUC	AUGCACGG
	2066	GAUUCCCA	CUGAUGA	X	GAA	AUGCCGUG	CACGGCAUC	UGGGAAUC

	2074	UGGAGGGG	CUGAUGA	X	GAA	AUUCCCAG	CUGGGAAUC	CCCCUCCA
	2080	GAUCUGUG	CUGAUGA	X	GAA	AGGGGGAU	AUCCCCCUC	CACAGAUC
	2088	AACCACAU	CUGAUGA	X	GAA	AUCUGUGG	CCACAGAUC	AUGUGGUU
	2096	UAUCUUUA	CUGAUGA	X	GAA	ACCACAUG	CAUGUGGUU	UAAAGAU
5	2097	UUAUCUUU	CUGAUGA	X	GAA	AACCACAU	AUGUGGUUU	AAAGAUAA
	2098	AUUAUCUU	CUGAUGA	X	GAA	AAACCACA	UGUGGUUUA	AAGAUAAU
	2104	GGUCUCAU	CUGAUGA	X	GAA	AUCUUUAA	UUAAAGAU	AUGAGACC
	2115	UCUUCUAC	CUGAUGA	X	GAA	AGGGUCUC	GAGACCCUU	GUAGAAGA
	2118	GAGUCUUC	CUGAUGA	X	GAA	ACAAGGGU	ACCCUUGUA	GAAGACUC
10	2126	CAAUGCCU	CUGAUGA	X	GAA	AGUCUUCU	AGAAGACUC	AGGCAUUG
	2133	UUCAAUAC	CUGAUGA	X	GAA	AUGCCUGA	UCAGGCAUU	GUAUUGAA
	2136	UCCUUCAA	CUGAUGA	X	GAA	ACAAUGCC	GGCAUUGUA	UUGAAGGA
	2138	CAUCCUUC	CUGAUGA	X	GAA	AUACAAUG	CAUUGUAUU	GAAGGAUG
	2160	CGGAUAGU	CUGAUGA	X	GAA	AGGUUCCG	CGGAACCUC	ACUAUCCG
15	2164	UCUGCGGA	CUGAUGA	X	GAA	AGUGAGGU	ACCUCACUA	UCCGCAGA
	2166	ACUCUGCG	CUGAUGA	X	GAA	AUAGUGAG	CUCACUAUC	CGCAGAGU
	2196	CAGGUGUA	CUGAUGA	X	GAA	AGGCCUUC	GAAGGCCUC	UACACCTUG
	2198	GGCAGGUG	CUGAUGA	X	GAA	AGAGGCTU	AGGCCUCUA	CACCUGCC
	2220	CAGCCAAG	CUGAUGA	X	GAA	ACACUGCA	UGCAGUGUU	CUUGGCUG
20	2221	ACAGCCAA	CUGAUGA	X	GAA	AACACUGC	GCAGUGUUC	UUGGCUGU
	2223	GCACAGCC	CUGAUGA	X	GAA	AGAACACU	AGUGUUCUU	GGCUGUGC
	2246	UUAUGAAA	CUGAUGA	X	GAA	AUGCCUCC	GGAGGCAUU	UUUCAUAA
	2247	AUUAUGAA	CUGAUGA	X	GAA	AAUGCCUC	GAGGCAUUU	UUCAUAAU
	2248	UAUUAUGA	CUGAUGA	X	GAA	AAAUGCCU	AGGCAUUUU	UCAUAAUA
25	2249	CUAUUAUG	CUGAUGA	X	GAA	AAAUGCC	GGCAUUUUU	CAUAAUAG
	2250	UCUAUUAU	CUGAUGA	X	GAA	AAAAAUGC	GCAUUUUUC	AUAAUAGA
	2253	CCUUCUUA	CUGAUGA	X	GAA	AUGAAAAA	UUUUUCAUA	AUAGAAGG
	2256	GCACCUUC	CUGAUGA	X	GAA	AUUAUGAA	UUCAUAAUA	GAAGGUGC
	2282	UGAUUUCC	CUGAUGA	X	GAA	AGUUCGUC	GACGAACUU	GGAAAUCA
30	2289	AGAAUAAU	CUGAUGA	X	GAA	AUUUCCAA	UUGGAAAU	AUUUUCU
	2292	ACUAGAAU	CUGAUGA	X	GAA	AUGAUUUC	GAAAUCAUU	AUUCUAGU
	2293	UACUAGAA	CUGAUGA	X	GAA	AAUGAUUU	AAAUCAUUA	UUCUAGUA
	2295	CCUACUAG	CUGAUGA	X	GAA	AUAAUGAU	AUCAUUAUU	CUAGUAGG

	2296	GCCUACUA	CUGAUGA	X	GAA	AAUAAUGA	UCAUUAUUC	UAGUAGGC
	2298	GUGCCUAC	CUGAUGA	X	GAA	AGAAUAAU	AUUUAUUCUA	GUAGGCAC
	2301	GUCGUGCC	CUGAUGA	X	GAA	ACUAGAAU	AUUCUAGUA	GGCACGAC
	2316	AACAUGGC	CUGAUGA	X	GAA	AUCACCGU	ACGGUGAUU	GCCAUGUU
5	2324	GCCAGAAG	CUGAUGA	X	GAA	ACAUGGCA	UGCCAUGUU	CUUCUGGC
	2325	AGCCAGAA	CUGAUGA	X	GAA	AACAUGGC	GCCAUGUUC	UUCUGGCU
	2327	GUAGCCAG	CUGAUGA	X	GAA	AGAACAUG	CAUGUUCUU	CUGGCUAC
	2328	AGUAGCCA	CUGAUGA	X	GAA	AAGAACAU	AUGUUCUUC	UGGCUACU
	2334	ACAAGAAG	CUGAUGA	X	GAA	AGCCAGAA	UUCUGGCUA	CUUCUUGU
10	2337	AUGACAAG	CUGAUGA	X	GAA	AGUAGCCA	UGGCUACUU	CUUGUCAU
	2338	GAUGACAA	CUGAUGA	X	GAA	AAGUAGCC	GGCUACUUC	UUGUCAUC
	2340	AUGAUGAC	CUGAUGA	X	GAA	AGAAGUAG	CUACUUCUU	GUCAUCAU
	2343	AGGAUGAU	CUGAUGA	X	GAA	ACAAGAAG	CUUCUUGUC	AUCAUCCU
	2346	CCUAGGAU	CUGAUGA	X	GAA	AUGACAAG	CUUGUCAUC	AUCCUAGG
15	2349	GUCCCUAG	CUGAUGA	X	GAA	AUGAUGAC	GUCAUCAUC	CUAGGGAC
	2352	ACGGUCCC	CUGAUGA	X	GAA	AGGAUGAU	AUCAUCCUA	GGGACCGU
	2361	GCCCGCTU	CUGAUGA	X	GAA	ACGGUCCC	GGGACCGUU	AAGCGGGC
	2362	GGCCCGCU	CUGAUGA	X	GAA	AACGGUCC	GGACCGUUA	AGCGGGCC
	2396	UGGACAAG	CUGAUGA	X	GAA	AGCCUGUC	GACAGGCUA	CUUGUCCA
20	2399	CGAUGGAC	CUGAUGA	X	GAA	AGUAGCCU	AGGCUACUU	GUCCAUCG
	2402	UGACGAUG	CUGAUGA	X	GAA	ACAAGUAG	CUACUUGUC	CAUCGUCA
	2406	UCCAUGAC	CUGAUGA	X	GAA	AUGGACAA	UUGUCCAUC	GUCAUGGA
	2409	GGAUCCAU	CUGAUGA	X	GAA	ACGAUGGA	UCCAUCGUC	AUGGAUCC
	2416	UUCAUCUG	CUGAUGA	X	GAA	AUCCAUGA	UCAUGGAUC	CAGAUGAA
25	2427	UCCAAUGG	CUGAUGA	X	GAA	AGUUCAUC	GAUGAACUC	CCAUUGGA
	2432	GUUCAUCC	CUGAUGA	X	GAA	AUGGGAGU	ACUCCCAUU	GGAUGAAC
	2443	UCGUUCAC	CUGAUGA	X	GAA	AUGUUCAU	AUGAACAUU	GUGAACGA
	2458	GGCAUCAU	CUGAUGA	X	GAA	AGGCAGUC	GACUGCCUU	AUGAUGCC
	2459	UGGCAUCA	CUGAUGA	X	GAA	AAGGCAGU	ACUGCCUUA	UGAUGCCA
30	2480	CUCUGGGG	CUGAUGA	X	GAA	AUUCCCAU	AUGGGAAUU	CCCCAGAG
	2481	UCUCUGGG	CUGAUGA	X	GAA	AAUUCCCA	UGGGAAUUC	CCCAGAGA
	2502	GGCUUACC	CUGAUGA	X	GAA	AGGUUCAG	CUGAACCUA	GGUAAGCC
	2506	AAGAGGCU	CUGAUGA	X	GAA	ACCUAGGU	ACCUAGGUA	AGCCUCUU

	2512	ACGGCCAA	CUGAUGA	X	GAA	AGGCUUAC	GUAAGCCUC	UUGGCCGU
	2514	CCACGGCC	CUGAUGA	X	GAA	AGAGGCUU	AAGCCUCUU	GGCCGUGG
	2528	CUUGGCCA	CUGAUGA	X	GAA	AGGCACCA	UGGUGCCUU	UGGCCAAG
	2529	UCUUGGCC	CUGAUGA	X	GAA	AAGGCACC	GGUGCCUUU	GGCCAAGA
5	2541	UCUGCUUC	CUGAUGA	X	GAA	AUCUCUUG	CAAGAGAUU	GAAGCAGA
	2555	CAAUUGCA	CUGAUGA	X	GAA	AGGCAUCU	AGAUGCCUU	UGGAAUUG
	2556	UCAAUUCC	CUGAUGA	X	GAA	AAGGCAUC	GAUGCCUUU	GGAAUUGA
	2562	GUCUUGUC	CUGAUGA	X	GAA	AUUCCAA	UUUGGAAU	GACAAGAC
	2578	UGUCCUGC	CUGAUGA	X	GAA	AGUUGCUG	CAGCAACUU	GCAGGACA
10	2589	UUGACUGC	CUGAUGA	X	GAA	ACUGUCCU	AGGACAGUA	GCAGUCAA
	2595	AACAUUUU	CUGAUGA	X	GAA	ACUGCUAC	GUAGCAGUC	AAAUGUU
	2603	CUUCUUUC	CUGAUGA	X	GAA	ACAUUUUG	CAAAAUGUU	GAAAGAAG
	2632	GAGAGCUC	CUGAUGA	X	GAA	AUGCUCAC	GUGAGCAUC	GAGCUCUC
	2638	AGACAUGA	CUGAUGA	X	GAA	AGCUCGAU	AUCGAGCUC	UCAUGUCU
15	2640	UCAGACAU	CUGAUGA	X	GAA	AGAGCUCG	CGAGCUCUC	AUGUCUGA
	2645	UGAGUUCA	CUGAUGA	X	GAA	ACAUGAGA	UCUCAUGUC	UGAACUCA
	2652	AGGAUCUU	CUGAUGA	X	GAA	AGUUCAGA	UCUGAACUC	AAGAUCTU
	2658	UGAAUGAG	CUGAUGA	X	GAA	AUCUUGAG	CUCAAGauc	CUCAUUCA
	2661	AUAUGAAU	CUGAUGA	X	GAA	AGGAUCUU	AAGAUCCUC	AUUCAUUU
20	2664	CCAAUAUG	CUGAUGA	X	GAA	AUGAGGAU	AUCCUCAUU	CAUAUUGG
	2665	ACCAUAUU	CUGAUGA	X	GAA	AAUGAGGA	UCCUCAUUC	AUAUUGGU
	2668	GUGACCAA	CUGAUGA	X	GAA	AUGAAUGA	UCAUUCUAU	UUGGUCAC
	2670	UGGUGACC	CUGAUGA	X	GAA	AUAUGAAU	AUUCAUUUU	GGUCACCA
	2674	GAGAUGGU	CUGAUGA	X	GAA	ACCAUAUU	AUAUUGGUC	ACCAUCUC
25	2680	CACAUUGA	CUGAUGA	X	GAA	AUGGUGAC	GUCACCAUC	UCAUGUG
	2682	ACCACAUU	CUGAUGA	X	GAA	AGAUGGUG	CACCAUCUC	AAUGUGGU
	2691	AGAAGGUU	CUGAUGA	X	GAA	ACCACAUU	AAUGUGGUC	AACCUUCU
	2697	GCACCUAG	CUGAUGA	X	GAA	AGGUUGAC	GUCAACCUU	CUAGGUGC
	2698	GGCACCUA	CUGAUGA	X	GAA	AAGGUUGA	UCAACCUUC	UAGGUGCC
30	2700	CAGGCACC	CUGAUGA	X	GAA	AGAAGGUU	AACCUUCUA	GGUGCCUG
	2710	UGGCUUGG	CUGAUGA	X	GAA	ACAGGCAC	GUGCCUGUA	CCAAGCCA
	2730	AUCACCAU	CUGAUGA	X	GAA	AGUGGCCC	GGGCCACUC	AUGGUGAU
	2739	AAUCCAC	CUGAUGA	X	GAA	AUCACCAU	AUGGUGAUU	GUGGAAUU

	2747	AUUUGCAG	CUGAUGA	X	GAA	AUUCCACA	UGUGGAAUU	CUGCAAUU
	2748	AAUUUGCA	CUGAUGA	X	GAA	AAUUCCAC	GUGGAAUUC	UGCAAUUU
	2756	GGUUUCCA	CUGAUGA	X	GAA	AUUUGCAG	CUGCAAUUU	UGGAAACC
	2757	AGGUUJCC	CUGAUGA	X	GAA	AAUUUGCA	UGCAAUUU	GGAAACCU
5	2768	GGUAAGUG	CUGAUGA	X	GAA	ACAGGUUU	AAACCUGUC	CACUUACC
	2773	CCUCAGGU	CUGAUGA	X	GAA	AGUGGACA	UGUCCACUU	ACCUGAGG
	2774	UCCUCAGG	CUGAUGA	X	GAA	AAGUGGAC	GUCCACUUA	CCUGAGGA
	2798	AGGGGACA	CUGAUGA	X	GAA	AUUCAUUU	AAAUGAAUU	UGUCCCCU
	2799	UAGGGGAC	CUGAUGA	X	GAA	AAUCAUUU	AAUGAAUUU	GUCCCCUA
10	2802	UUGUAGGG	CUGAUGA	X	GAA	ACAAAUUC	GAAUUUGUC	CCCUACAA
	2807	UGGUCUUG	CUGAUGA	X	GAA	AGGGGACA	UGUCCCCUA	CAAGACCA
	2828	CUUGACGG	CUGAUGA	X	GAA	AUCGUGCC	GGCACGAUU	CCGUCAAG
	2829	CCUUGACG	CUGAUGA	X	GAA	AAUCGUGC	GCACGAUUC	CGUCAAGG
	2833	UUUCCCUU	CUGAUGA	X	GAA	ACGGAAUC	GAUUCCGUC	AAGGGAAA
15	2846	CUCCAACG	CUGAUGA	X	GAA	AGUCUUUC	GAAAGACUA	CGUUGGAG
	2850	AUUGCUCC	CUGAUGA	X	GAA	ACGUAGUC	GACUACGUU	GGAGCAAU
	2859	UCCACAGG	CUGAUGA	X	GAA	AUUGCUCC	GGAGCAAUC	CCUGUGGA
	2869	CCGUUJCA	CUGAUGA	X	GAA	AUCCACAG	CUGUGGAUC	UGAAACGG
	2882	UGCUGUCC	CUGAUGA	X	GAA	AGCGCCGU	ACGGCGCUU	GGACAGCA
20	2892	CUACUGGU	CUGAUGA	X	GAA	AUGCUGUC	GACAGCAUC	ACCAGUAG
	2899	GCUCUGGC	CUGAUGA	X	GAA	ACUGGUGA	UCACCAGUA	GCCAGAGC
	2909	AGCUGGCU	CUGAUGA	X	GAA	AGCUCUGG	CCAGAGCUC	AGCCAGCU
	2918	CAAAUCCA	CUGAUGA	X	GAA	AGCUGGCU	AGCCAGCUC	UGGAUUUG
	2924	CCUCCACA	CUGAUGA	X	GAA	AUCCAGAG	CUCUGGAUU	UGUGGAGG
25	2925	UCCUCCAC	CUGAUGA	X	GAA	AAUCCAGA	UCUGGAUUU	GUGGAGGA
	2939	CACUGAGG	CUGAUGA	X	GAA	ACUUCUCC	GGAGAAGUC	CCUCAGUG
	2943	ACAUCACU	CUGAUGA	X	GAA	AGGGACUU	AAGUCCUC	AGUGAUGU
	2952	UCUUCUUC	CUGAUGA	X	GAA	ACAUCACU	AGUGAUGUA	GAAGAAGA
	2968	AUCUUCAG	CUGAUGA	X	GAA	AGCUUCCU	AGGAAGCUC	CUGAAGAU
30	2977	CUUAUACA	CUGAUGA	X	GAA	AUCUUCAG	CUGAAGAUU	UGUAUAAG
	2981	AGUCCUUA	CUGAUGA	X	GAA	ACAGAUCU	AGAUCUGUA	UAAGGACU
	2983	GAAGUCCU	CUGAUGA	X	GAA	AUACAGAU	AUCUGUAUA	AGGACUUC
	2990	AGGUCAGG	CUGAUGA	X	GAA	AGUCCUUA	UAAGGACUU	CCUGACCU

	2991	AAGGUCAG	CUGAUGA	X	GAA	AAGUCCUU	AAGGACUUC	CUGACCUU
	2999	GAUGCUC	CUGAUGA	X	GAA	AGGUCAGG	CCUGACCUU	GGAGCAUC
	3007	ACAGAUGA	CUGAUGA	X	GAA	AUGCUGCA	UGGAGCAUC	UCAUCUGU
	3009	UAACAGAU	CUGAUGA	X	GAA	AGAUGCUC	GAGCAUCUC	AUCUGUUA
5	3012	CUGUAACA	CUGAUGA	X	GAA	AUGAGAUG	CAUCUCAUC	UGUUAACAG
	3016	GAAGCUGU	CUGAUGA	X	GAA	ACAGAUGA	UCAUCUGUU	ACAGCUUC
	3017	GGAAGCUG	CUGAUGA	X	GAA	AACAGAUG	CAUCUGUUA	CAGCUUCC
	3023	CCACUUGG	CUGAUGA	X	GAA	AGCUGUAA	UUACAGCUU	CCAAGUGG
	3024	GCCACUUG	CUGAUGA	X	GAA	AAGCUGUA	UACAGCUUC	CAAGUGGC
10	3034	CAUGCCCU	CUGAUGA	X	GAA	AGCCACUU	AAGUGGCUA	AGGGCAUG
	3047	AUGCCAAG	CUGAUGA	X	GAA	ACUCCAUG	CAUGGAGUU	CUUGGCAU
	3048	GAUGCCAA	CUGAUGA	X	GAA	AACUCCAU	AUGGAGUUC	UUGGCAUC
	3050	GCGAUGCC	CUGAUGA	X	GAA	AGAACUCC	GGAGUUCUU	GGCAUCGC
	3056	ACUUUCGC	CUGAUGA	X	GAA	AUGCCAAG	CUUGGCAUC	GCGAAAGU
15	3067	CCUGUGGA	CUGAUGA	X	GAA	ACACUUUC	GAAAGUGUA	UCCACAGG
	3069	UCCCUUGU	CUGAUGA	X	GAA	AUACACUU	AAGUGUAUC	CACAGGGA
	3094	UAAGAGGA	CUGAUGA	X	GAA	AUUUCGUG	CACGAAUA	UCCUCUUA
	3096	GAUAAGAG	CUGAUGA	X	GAA	AUAUUUCG	CGAAAUUUC	CUCUUAUC
	3099	UCCGAUAA	CUGAUGA	X	GAA	AGGAUAUU	AAUAUCCUC	UUAUCCGA
20	3101	UCUCCGAU	CUGAUGA	X	GAA	AGAGGAUA	UAUCCUCUU	AUCGGAGA
	3102	UUCUCCGA	CUGAUGA	X	GAA	AAGAGGAU	AUCCUCUUA	UCGGAGAA
	3104	UCUUCUCC	CUGAUGA	X	GAA	AUAAGAGG	CCUCUUAUC	GGAGAAGA
	3120	CAGAUUUU	CUGAUGA	X	GAA	ACCACGUU	AACGUGGUU	AAAUCUG
	3121	ACAGAUUU	CUGAUGA	X	GAA	AACCACGU	ACGUGGUUA	AAUCUGU
25	3126	AAGUCACA	CUGAUGA	X	GAA	AUUUUAAC	GUUAAAUC	UGUGACUU
	3134	CCAAGCCA	CUGAUGA	X	GAA	AGUCACAG	CUGUGACUU	UGGCUUGG
	3135	GCCAAGCC	CUGAUGA	X	GAA	AAGUCACA	UGUGACUUU	GGCUUGGC
	3140	CCCGGGCC	CUGAUGA	X	GAA	AGCCAAAG	CUUUGGCUU	GGCCCGGG
	3151	UUUAUAAA	CUGAUGA	X	GAA	AUCCCGGG	CCCGGGAUA	UUUAUAAA
30	3153	UCUUUAUA	CUGAUGA	X	GAA	AUAUCCCG	CGGGAUAUU	UAUAAAGA
	3154	AUCUUUAU	CUGAUGA	X	GAA	AAUAUCCC	GGGAUAUUU	AUAAAGAU
	3155	GAUCUUUA	CUGAUGA	X	GAA	AAUAUCC	GGUAUUUA	UAAAGAU
	3157	UGGAUCUU	CUGAUGA	X	GAA	AUAAUAU	AUAUUUAUA	AAGAUCCA

	3163	AUAAUCUG	CUGAUGA	X	GAA	AUCUUUUAU	AUAAAGAUC	CAGAUUAU
	3169	UCUGACAU	CUGAUGA	X	GAA	AUCUGGAU	AUCCAGAUU	AUGUCAGA
	3170	UUCUGACA	CUGAUGA	X	GAA	AAUCUGGA	UCCAGAUUA	UGUCAGAA
	3174	CCUUUUUCU	CUGAUGA	X	GAA	ACAUAAUC	GAUUAUGUC	AGAAAAGG
5	3190	AGGGAGGC	CUGAUGA	X	GAA	AGCAUCUC	GAGAUGCUC	GCCUCCCU
	3195	UUCAAAGG	CUGAUGA	X	GAA	AGGCGAGC	GCUCGCCUC	CCUUGGAA
	3199	CCAUUUCA	CUGAUGA	X	GAA	AGGGAGGC	GCCUCCCUU	UGAAAUGG
	3200	UCCAUUUC	CUGAUGA	X	GAA	AAGGGAGG	CCUCCCUUU	GAAAUGGA
	3225	CUGUCAA	CUGAUGA	X	GAA	AUUGUUUC	GAAACAAU	UUUGACAG
10	3226	UCUGUCAA	CUGAUGA	X	GAA	AAUUGUUU	AAACAAUUU	UUGACAGA
	3227	CUCUGUCA	CUGAUGA	X	GAA	AAUUGUUU	AACAAUUUU	UGACAGAG
	3228	ACUCUGUC	CUGAUGA	X	GAA	AAAUUGU	ACAAUUUUU	GACAGAGU
	3239	GGAUUGUG	CUGAUGA	X	GAA	ACACUCUG	CAGAGUGUA	CACAAUCC
	3246	UCACUCUG	CUGAUGA	X	GAA	AUUGUGUA	UACACAAUC	CAGAGUGA
15	3258	AAAGACCA	CUGAUGA	X	GAA	ACGUCACU	AGUGACGUC	UGGUCUUU
	3263	CACCAAAA	CUGAUGA	X	GAA	ACCAGACG	CGUCUGGUC	UUUUGGUG
	3265	AACACCAA	CUGAUGA	X	GAA	AGACCAGA	UCUGGUCUU	UUGGUGUU
	3266	AAACACCA	CUGAUGA	X	GAA	AAGACCAG	CUGGUCUUU	UGGUGUUU
	3267	AAAACACC	CUGAUGA	X	GAA	AAAGACCA	UGGUCUUUU	GGUGUUUU
20	3273	CACAGCAA	CUGAUGA	X	GAA	ACACCAA	UUUGGUGUU	UUGCUGUG
	3274	CCACAGCA	CUGAUGA	X	GAA	AACACCAA	UUGGUGUUU	UGCUGUGG
	3275	CCCACAGC	CUGAUGA	X	GAA	AAACACCA	UGGUGUUUU	GCUGUGGG
	3288	AAGGAAA	CUGAUGA	X	GAA	AUUUCCCA	UGGGAAUA	UUUCCCUU
	3290	CUAAGGAA	CUGAUGA	X	GAA	AUAUUUCC	GGAAAUUUU	UCCCUUAG
25	3291	CCUAAGGA	CUGAUGA	X	GAA	AAUAUUUC	GAAAUUUUU	UCCUUAGG
	3292	ACCUAAGG	CUGAUGA	X	GAA	AAAUUUUU	AAAUUUUUU	CCUUAGGU
	3293	CACCUAAG	CUGAUGA	X	GAA	AAAAUUUU	AAAUUUUUU	CUUAGGUG
	3296	AAGCACCU	CUGAUGA	X	GAA	AGGAAAAU	AUUUUCCUU	AGGUGCUU
	3297	GAAGCACC	CUGAUGA	X	GAA	AAGGAAAA	UUUUCCUUA	GGUGCUUC
30	3304	AUAUGGAG	CUGAUGA	X	GAA	AGCACCUA	UAGGUGCUU	CUCCAUAU
	3305	GAUAUGGA	CUGAUGA	X	GAA	AAGCACCU	AGGUGCUUC	UCCAUAUC
	3307	AGGAUAUG	CUGAUGA	X	GAA	AGAAGCAC	GUGCUUCUC	CAUAUCCU
	3311	CCCCAGGA	CUGAUGA	X	GAA	AUGGAGAA	UUCUCCAUA	UCCUGGGG

	3313	UACCCAG	CUGAUGA	X	GAA	AUAUGGAG	CUCCAUAUC	CUGGGGUA
	3321	UCAAUCU	CUGAUGA	X	GAA	ACCCAGG	CCUGGGGUA	AAGAUUGA
	3327	UCUUCAUC	CUGAUGA	X	GAA	AUCUUUAC	GUAAAGAUU	GAUGAAGA
	3338	GCCUACAA	CUGAUGA	X	GAA	AUUCUUCA	UGAAGAAUU	UGUAGGCG
5	3339	CGCCUACA	CUGAUGA	X	GAA	AAUUCUUC	GAAGAAUUU	UGUAGGCG
	3340	UCGCCUAC	CUGAUGA	X	GAA	AAUUCUUC	AAGAAUUUU	GUAGGCGA
	3343	CAAUCGCC	CUGAUGA	X	GAA	ACAAAUU	AAUUUUGUA	GGCGAUUG
	3350	CUUCUUUC	CUGAUGA	X	GAA	AUCGCCUA	UAGGCGAUU	GAAAGAAG
	3364	CCUCAUUC	CUGAUGA	X	GAA	AGUCCUUC	AAGGAACUA	GAAUGAGG
10	3382	UGUAGUAU	CUGAUGA	X	GAA	AUCAGGGG	CCCCUGAUU	AUACUACA
	3383	GUGUAGUA	CUGAUGA	X	GAA	AAUCAGGG	CCCUGAUUA	UACUACAC
	3385	UGGUGUAG	CUGAUGA	X	GAA	AUAAUCAG	CUGAUUAUA	CUACACCA
	3388	UUCUGGUG	CUGAUGA	X	GAA	AGUAUAAU	AUUUAUACUA	CACCAGAA
	3401	UGGUCUGG	CUGAUGA	X	GAA	ACAUUUCU	AGAAAUGUA	CCAGACCA
15	3439	GGGUCUCU	CUGAUGA	X	GAA	ACUGGGCU	AGCCCAGUC	AGAGACCC
	3452	ACUCUGAA	CUGAUGA	X	GAA	ACGUGGGU	ACCCACGUU	UUCAGAGU
	3453	AACUCUGA	CUGAUGA	X	GAA	AACGUGGG	CCCACGUUU	UCAGAGUU
	3454	CAACUCUG	CUGAUGA	X	GAA	AAACGUGG	CCACGUUUU	CAGAGUUG
	3455	CCAACUCU	CUGAUGA	X	GAA	AAAACGUG	CACGUUUUC	AGAGUUGG
20	3461	GUUCCACC	CUGAUGA	X	GAA	ACUCUGAA	UUCAGAGUU	GGUGGAAC
	3472	AUUUCCCA	CUGAUGA	X	GAA	AUGUUCCA	UGGAACAUU	UGGGAAAU
	3473	GAUUUCCC	CUGAUGA	X	GAA	AAUGUUCC	GGAACAUUU	GGGAAAUU
	3481	UUGCAAGA	CUGAUGA	X	GAA	AUUUCCCA	UGGGAAAUU	UCUUGCAA
	3483	GCUUGCAA	CUGAUGA	X	GAA	AGAUUUCC	GGAAAUUCU	UUGCAAGC
25	3485	UAGCUUGC	CUGAUGA	X	GAA	AGAGAUUU	AAAUCUCUU	GCAAGCUA
	3493	CUGAGCAU	CUGAUGA	X	GAA	AGCUUGCA	UGCAAGCUA	AUGCUCAG
	3499	AUCCUGCU	CUGAUGA	X	GAA	AGCAUUAG	CUAAUGCUC	AGCAGGAU
	3518	GAACAAUG	CUGAUGA	X	GAA	AGUCUUUG	CAAAGACUA	CAUUGUUC
	3522	GGAAGAAC	CUGAUGA	X	GAA	AUGUAGUC	GACUACAUU	GUUCUUCC
30	3525	AUCGGAAG	CUGAUGA	X	GAA	ACAAUGUA	UACAUUGUU	CUUCCGAU
	3526	UAUCGGAA	CUGAUGA	X	GAA	AACAAUGU	ACAUUGUUC	UUCCGAUA
	3528	GAUAUCGG	CUGAUGA	X	GAA	AGAACAAU	AUUGUUCUU	CCGAUAUC
	3529	UGAUAUCC	CUGAUGA	X	GAA	AAGAACAA	UUGUUCUUC	CGAUAUCA

	3534	GUCUCUGA	CUGAUGA	X	GAA	AUCGGAAG	CUUCCGAUA	UCAGAGAC
	3536	AAGUCUCU	CUGAUGA	X	GAA	AUAUCGGA	UCCGAUAUC	AGAGACUU
	3544	CAUGCUC	CUGAUGA	X	GAA	AGUCUCUG	CAGAGACUU	UGAGCAUG
	3545	CCAUGCUC	CUGAUGA	X	GAA	AAGUCUCU	AGAGACUUU	GAGCAUGG
5	3562	GAGUCCAG	CUGAUGA	X	GAA	AUCCUCUU	AAGAGGAUU	CUGGACUC
	3563	AGAGUCCA	CUGAUGA	X	GAA	AAUCCUCU	AGAGGAUUC	UGGACUCU
	3570	GGCAGAGA	CUGAUGA	X	GAA	AGUCCAGA	UCUGGACUC	UCUCUGCC
	3572	UAGGCAGA	CUGAUGA	X	GAA	AGAGUCCA	UGGACUCUC	UCUGCCUA
	3574	GGUAGGCA	CUGAUGA	X	GAA	AGAGAGUC	GACUCUCUC	UGCCUACC
10	3580	AGGUGAGG	CUGAUGA	X	GAA	AGGCAGAG	CUCUGCCUA	CCUCACCU
	3584	AAACAGGU	CUGAUGA	X	GAA	AGGUAGGC	GCCUACCUC	ACCUGUUU
	3591	AUACAGGA	CUGAUGA	X	GAA	ACAGGUGA	UCACCUGUU	UCCUGUAU
	3592	CAUACAGG	CUGAUGA	X	GAA	AACAGGUG	CACCUGUUU	CCUGUAUG
	3593	CCAUACAG	CUGAUGA	X	GAA	AAACAGGU	ACCUGUUUC	CUGUAUGG
15	3598	CUCCUCCA	CUGAUGA	X	GAA	ACAGGAAA	UUUCCUGUA	UGGAGGAG
	3615	GGGUCACA	CUGAUGA	X	GAA	ACUCCUC	GAGGAAGUA	UGUGACCC
	3629	CAUAAUGG	CUGAUGA	X	GAA	AUUUGGGG	CCCCAAAUU	CCAUUAUG
	3630	UCAUAAUG	CUGAUGA	X	GAA	AAUUUGGG	CCCCAAUUC	CAUUAUGA
	3634	GUUGUCAU	CUGAUGA	X	GAA	AUGGAAUU	AAUCCAUU	AUGACAAC
20	3635	UGUUGUCA	CUGAUGA	X	GAA	AAUGGAAU	AUUCCAUUA	UGACAACA
	3654	UACUGACU	CUGAUGA	X	GAA	AUCCUGC	GCAGGAAUC	AGUCAGUA
	3658	CAGAUACU	CUGAUGA	X	GAA	ACUGAUUC	GAAUCAGUC	AGUAUCUG
	3662	UCUGCAGA	CUGAUGA	X	GAA	ACUGACUG	CAGUCAGUA	UCUGCAGA
	3664	GUUCUGCA	CUGAUGA	X	GAA	AUACUGAC	GUCAGUAUC	UGCAGAAC
25	3676	CUUUCGCU	CUGAUGA	X	GAA	ACUGUUCU	AGAACAGUA	AGCGAAAG
	3702	AAUGUUUU	CUGAUGA	X	GAA	ACACUCAC	GUGAGUGUA	AAAACAUU
	3710	UAUCUJCA	CUGAUGA	X	GAA	AUGUUUUU	AAAAACAUU	UGAAGUAU
	3711	AUAUCUUC	CUGAUGA	X	GAA	AAUGUUUU	AAAACAUUU	GAAGAUUU
	3718	UAACGGGA	CUGAUGA	X	GAA	AUCUJCAA	UUGAAGUAU	UCCCGUUA
30	3720	UCUAAACGG	CUGAUGA	X	GAA	AUAUCUUC	GAAGAUUUC	CCGUUAGA
	3725	GUUCUUCU	CUGAUGA	X	GAA	ACGGGAUA	UAUCCCGUU	AGAAGAAC
	3726	GGUUCUUC	CUGAUGA	X	GAA	AACGGGAU	AUCCCGUUA	GAAGAACC
	3741	AUUACUUU	CUGAUGA	X	GAA	ACUUCUGG	CCAGAAGUA	AAAGUAAU

	3747	UCUGGGAU	CUGAUGA	X	GAA	ACUUUUAC	GUAAAAGUA	AUCCCAGA
	3750	UCAUCUGG	CUGAUGA	X	GAA	AUUACUUU	AAAGUAAUC	CCAGAUGA
	3778	AAGAACCA	CUGAUGA	X	GAA	ACCACUGU	ACAGUGGUA	UGGUUCUU
	3783	GAGGCAAG	CUGAUGA	X	GAA	ACCAUACC	GGUAUGGUU	CUUGCCUC
5	3784	UGAGGCAA	CUGAUGA	X	GAA	AACCAUAC	GUAUGGUUC	UUGCCUCA
	3786	UCUGAGGC	CUGAUGA	X	GAA	AGAACCAU	AUGGUUCUU	GCCUCAGA
	3791	GCUCUUCU	CUGAUGA	X	GAA	AGGCAAGA	UCUUGCCUC	AGAAGAGC
	3808	GUCUCCA	CUGAUGA	X	GAA	AGUUUUA	UGAAAACUU	UGGAAGAC
	3809	UGUCUCC	CUGAUGA	X	GAA	AAGUUUUC	GAAAACUUU	GGAAGACA
10	3827	AUGGAGAU	CUGAUGA	X	GAA	AUUUGGUU	AACCAAUUU	AUCUCCAUC
	3828	GAUGGAGA	CUGAUGA	X	GAA	AAUUUGGU	ACCAAUUUA	UCUCCAUC
	3830	AAGAUGGA	CUGAUGA	X	GAA	AUAAUUG	CAAAUUUUC	UCCAUCUU
	3832	AAAAGAUG	CUGAUGA	X	GAA	AGAUAAU	AAUUAUCUC	CAUCUUUU
	3836	CACCAAAA	CUGAUGA	X	GAA	AUGGAGAU	AUCUCCAUC	UUUUGGUG
15	3838	UCCACCAA	CUGAUGA	X	GAA	AGAUGGAG	CUCCAUCUU	UUGGUGGA
	3839	UCCACCA	CUGAUGA	X	GAA	AAGAUGGA	UCCAUCUUU	UGGUGGAA
	3840	AUCCACC	CUGAUGA	X	GAA	AAAGAUGG	CCAUCUUUU	GGUGGAAU
	3872	AUGCCACA	CUGAUGA	X	GAA	ACUCCUG	CAGGGAGUC	UGUGGCAU
	3881	AGCCUUA	CUGAUGA	X	GAA	AUGCCACA	UGUGGCAUC	UGAAGGCU
20	3890	UCUGGUUU	CUGAUGA	X	GAA	AGCCUUA	UGAAGGCUC	AAACCAGA
	3908	CGGACUGG	CUGAUGA	X	GAA	AGCCGCUU	AAGCGGCUA	CCAGUCCG
	3914	GAUAUCCG	CUGAUGA	X	GAA	ACUGGUAG	CUACCAGUC	CGGAUAUC
	3920	CGGAGUGA	CUGAUGA	X	GAA	AUCCGGAC	GUCCGGAUA	UCACUCCG
	3922	AUCGGAGU	CUGAUGA	X	GAA	AUAUCCGG	CCGGAUAUC	ACUCCGAU
25	3926	UGUCAUCG	CUGAUGA	X	GAA	AGUGAUAU	AUAUCACUC	CGAUGACA
	3950	CACUGGAG	CUGAUGA	X	GAA	ACACGGUG	CACCGUGUA	CUCCAGUG
	3953	CCUCACUG	CUGAUGA	X	GAA	AGUACACG	CGUGUACUC	CAGUGAGG
	3972	AGCUUUA	CUGAUGA	X	GAA	AGUUCUGC	GCAGAACUU	UUAAGCU
	3973	CAGCUUUA	CUGAUGA	X	GAA	AAGUUCUG	CAGAACUUU	UAAAGCUG
30	3974	UCAGCUUU	CUGAUGA	X	GAA	AAAGUUCU	AGAACUUUU	AAAGCUGA
	3975	AUCAGCUU	CUGAUGA	X	GAA	AAAAGUUC	GAACUUUUA	AAGCUGAU
	3984	CCAAUCUC	CUGAUGA	X	GAA	AUCAGCUU	AAGCUGAUA	GAGAUUGG
	3990	UGCACUCC	CUGAUGA	X	GAA	AUCUCUAU	AUAGAGAUU	GGAGUGCA

	4006	GGCUGUGC CUGAUGA X GAA ACCGGUUU	AAACCGGUA GCACAGCC
	4020	GGCUGGAG CUGAUGA X GAA AUCUGGGC	GCCCAGAUU CUCCAGCC
	4021	AGGCUGGA CUGAUGA X GAA AAUCUGGG	CCCAGAUUC UCCAGCCU
	4023	UCAGGCUG CUGAUGA X GAA AGAAUCUG	CAGAUUCUC CAGCCUGA
5	4052	CAGGAGGA CUGAUGA X GAA AGCUCAGU	ACUGAGCUC UCCUCCUG
	4054	AACAGGAG CUGAUGA X GAA AGAGCUCA	UGAGCUCUC CUCCUGUU
	4057	UUAAACAG CUGAUGA X GAA AGGAGAGC	GCUCUCCUC CUGUUUAA
	4062	UCCUUUUA CUGAUGA X GAA ACAGGAGG	CCUCCUGUU UAAAAGGA
	4063	UUCCUUUU CUGAUGA X GAA AACAGGAG	CUCCUGUUU AAAAGGAA
10	4064	CUUCCUUU CUGAUGA X GAA AAACAGGA	UCCUGUUUA AAAGGAAG
	4076	GGGGUGUG CUGAUGA X GAA AUGCUUCC	GGAAGCAUC CACACCCC
	4089	AUGUCCGG CUGAUGA X GAA AGUUGGGG	CCCCAACUC CCGGACAU
	4098	UCUCAUGU CUGAUGA X GAA AUGUCCGG	CCGGACAUC ACAUGAGA
	4110	UCUGAGCA CUGAUGA X GAA ACCUCUCA	UGAGAGGUC UGCUCAGA
15	4115	CAAAAUCU CUGAUGA X GAA AGCAGACC	GGUCUGCUC AGAUUUUG
	4120	CACUUCAA CUGAUGA X GAA AUCUGAGC	GCUCAGAUU UUGAAGUG
	4121	ACACUUCA CUGAUGA X GAA AAUCUGAG	CUCAGAUUU UGAAGUGU
	4122	AACACUUC CUGAUGA X GAA AAAUCUGA	UCAGAUUUU GAAGUGUU
	4130	GAAAGAAC CUGAUGA X GAA ACACUUCA	UGAAGUGUU GUUCUUUC
20	4133	GUGGAAAG CUGAUGA X GAA ACAACACU	AGUGUUGUU CUUCCAC
	4134	GGUGGAAA CUGAUGA X GAA AACAACAC	GUGUUGUUC UUUCCACC
	4136	CUGGUGGA CUGAUGA X GAA AGAACAAC	GUUGUUCUU UCCACCAG
	4137	GCUGGUGG CUGAUGA X GAA AAGAACAA	UUGUUCUUU CCACCAGC
	4138	UGCUGGUG CUGAUGA X GAA AAAGAACA	UGUUCUUUC CACCAGCA
25	4153	AAUGCGGC CUGAUGA X GAA ACUUCCUG	CAGGAAGUA GCCGCAUU
	4161	GAAAAUCA CUGAUGA X GAA AUGCGGCU	AGCCGCAUU UGAUUUUC
	4162	UGAAAAUC CUGAUGA X GAA AAUGCGGC	GCCGCAUUU GAUUUUCA
	4166	GAAAUCAA CUGAUGA X GAA AUCAAUUG	CAUUUGAUU UUCAUUUC
	4167	CGAAAUUA CUGAUGA X GAA AAUCAAAU	AUUUGAUUU UCAUUUCG
30	4168	UCGAAAUU CUGAUGA X GAA AAUCAAAA	UUUGAUUUU CAUUUCGA
	4169	GUCGAAAU CUGAUGA X GAA AAAUCAAA	UUGAUUUUC AUUUCGAC
	4172	GUUGUCGA CUGAUGA X GAA AUGAAAAU	AUUUUCAUU UCGACAAC
	4173	UGUUGUCG CUGAUGA X GAA AAUGAAAA	UUUUCAUUU CGACAACA

117

4174	CUGUUGUC	CUGAUGA	X	GAA	AAAUGAAA	UUUCAUUUC	GACAACAG
4194	UGCAGUCC	CUGAUGA	X	GAA	AGGUCCUU	AAGGACCUC	GGACUGCA
4214	GCCUAGAA	CUGAUGA	X	GAA	AGCUGGCU	AGCCAGCUC	UUCUAGGC
4216	AAGCCUAG	CUGAUGA	X	GAA	AGAGCUGG	CCAGCUCUU	CUAGGCUU
5 4217	CAAGCCUA	CUGAUGA	X	GAA	AAGAGCUG	CAGCUCUUC	UAGGCUUG
4219	CACAAGCC	CUGAUGA	X	GAA	AGAAGAGC	GCUCUUCUA	GGCUUGUG

Where "X" represents stem II region of a HH ribozyme (Hertel et al., 1992 Nucleic Acids Res. 20 3252). The length of stem II may be ≥ 2 base-pairs.

118

Table V: Human KDR VEGF Receptor-Hairpin Ribozyme and Substrate Sequences

nt.	Hairpin Ribozyme Sequence		Substrate
Position			
11	CGACGGCC	AGAA GCACCU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	AGGUGCU GCU GGCCGUCG
5	CACAGGGC	AGAA GCCAGC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	GCUGGCC GUC GCCCUGUG
51	CCCACAGA	AGAA GCCCGG ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	CCGGGCC GCC UCUGUGGG
86	UGAGCCUG	AGAA GAUCAA ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	UUGAUCU GCC CAGGCUCA
318	GAGGCCAA	AGAA GUUUC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	GGAAACU GAC UUGGCCUC
358	AAUUGGAG	AGAA GUAAUC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	GAUUAUA GAU CUCCAUAU
10	CUGUUAAC	AGAA GGAACA ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	UGUUCU GAU GGUAAACAG
623	ACAUAAUA	AGAA GGUAAC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	GUUACCA GUC UAUUAUGU
683	UCCAUGA	AGAA GACUCA ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	UGAGUCC GUC UCAUGGAA
705	UUUUCUCC	AGAA GAUAGU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	ACUAUCU GUU GGAGAAAA
833	CACUCCCA	AGAA GGGUUU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	AAACCCA GUC UGGGAGUG
15	UCUUGGUC	AGAA GCCCAC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	GUGGGCU GAU GACCAAGA
1142	CCAUAAUC	AGAA GUACAU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	AUGUACU GAC GAUUAUGG
1259	UCUCACCA	AGAA GGGGUG ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	CACCCCA GAU UGGUGAGA
1332	AUGGCAUA	AGAA GUACAU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	AUGUACG GUC UAUGCCAU

118

119

1376	CUUCUCC AGAA GCCAAU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	AUUGGCA GUTU GGAGGAAG
1413	GUCACUGA AGAA GCUUGG ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	CCAAGCU GUC UCAGUGAC
1569	UUGUACAA AGAA GACACA ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	UGUGUCA GCU UUGUACAA
1673	GCUCAGUG AGAA GCAUGU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	ACAUGCA GCC CACUGAGC
5 1717	AAACGUAG AGAA GUCUGC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	GCAGACA GAU CUACGUUU
1760	UUGGCAGA AGAA GUGGGC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	GCCACA GCC UCUGCCAA
1797	UUCUUGCA AGAA GGUGUG ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	CACACCU GUTU UGCAAGAA
1918	UUGAGCAA AGAA GACAUU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	UAUGUCU GCC UUGCUCAA
1967	GGACUGUG AGAA GCCUGA ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	UCAGGCA GCU CACAGUCC
10 1974	CGCUCUAG AGAA GUGAGC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	GCUCACA GUC CUAGAGCG
2021	UACUUGUC AGAA GAUUCU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	AGAAUCA GAC GACAAAGUA
2084	ACCACAUG AGAA GUGGAG ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	CUCCACA GAU CAUGUGGU
2418	GGGAGUUC AGAA GGAUCC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	GGAUCCA GAU GAACUCCC
2453	CAUCAUAA AGAA GUCGUU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	AACGACU GCC UUAUGAUG
15 2492	CUAGGUUC AGAA GGUCUC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	GAGACCG GCU GAACCUUAG
2547	CCAAAGGC AGAA GCUUCA ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	UGAAAGCA GAU GCCUUUGG
2765	GGUAAGUG AGAA GGUUUC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	GAUAACCU GUC CACUUAAC
2914	AAAUCCAG AGAA GGCUGA ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	UCAGGCCA GCU CUGGAUUU
2993	GCUCCAAG AGAA GGAAGU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	ACUUCCU GAC CUUGGAGC

119

120

3019	CACUUGGA AGAA GUAACA ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	UGUUAACA GCU UCCAAGUG
3165	CUGACAUA AGAA GGAUCU ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	AGAUCCA GAU UAUGUCAG
3378	GUAGUAUA AGAA GGGGCC ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	GGCCCCU GAU UAUACUAC
3404	CCAGCAUG AGAA GGUACA ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	UGUACCA GAC CAUGCUGG
5 3418	CCCGUGCC AGAA GUCCAG ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	CUGGACU GCU GGCACGGG
3575	GUGAGGUA AGAA GAGAGA ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	UCUCUCU GCC UACCUCAC
3588	AUACAGGA AGAA GGUGAG ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	CUCACCU GUU UCCUGUAU
3689	CACUCACA AGAA GGCUCU ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	AGAGCCG GCC UGUGAGUG
3753	UGGUUGUC AGAA GGGAUU ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	AAUCCCA GAU GACAACCA
10 3764	CACUGUCC AGAA GGUUGU ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	ACAAACA GAC GGACAGUG
3911	GAUAUCCG AGAA GGUAGC ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	GCUACCA GUC CGGAUAUC
3927	UCUGUGUC AGAA GAGUGA ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	UCACUCC GAU GACACAGA
4011	AGAAUCUG AGAA GUGCUA ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	UAGCACA GCC CAGAUUUC
4016	GCUGGAGA AGAA GGGCUG ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	CAGCCCA GAU UCUCACGC
15 4025	CCGUGUCA AGAA GGAGAA ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	UUCUCCA GCC UGACACGG
4059	UCCUUUUA AGAA GGAGGA ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	UCCUCCU GUU UAAAAGGA
4111	AAAAUCUG AGAA GACCUC ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	GAGGUCU GCU CAGAUUUU
4116	ACUUCAAA AGAA GAGCAG ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	CUGCUCU GAU UUUGAAGU
4195	UCCCUGCA AGAA GAGGUC ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	GACCUCG GAC UGCAGGGA

120

121

121

4210 CCUAGAAG AGAA GGCUCC ACCAGAGAAAACACACGUGUGUGGUACAUUACCUGGUA GGAGCCA GCU CUUCUAGG

Table VI: Mouse *flk-1* VEGF Receptor-Hammerhead Ribozyme and Substrate Sequence

	nt. Posi tion	HH Ribozyme Sequence	Substrate
5	13	CCGUACCC CUGAUGA X GAA AUUCGCCC	GGGCGAAUU GGGUACGG
	18	GGGUCCCC CUGAUGA X GAA ACCCAAUU	AAUUGGGUA CGGGACCC
	31	UCGACCUC CUGAUGA X GAA AGGGGGGU	ACCCCCCUC GAGGUCGA
	37	AUACCGUC CUGAUGA X GAA ACCUCGAG	CUCGAGGUC GACGGUAU
10	44	CUUAUCGA CUGAUGA X GAA ACCGUCGA	UCGACGGUA UCGAUAAG
	46	AGCUUAUC CUGAUGA X GAA AUACCGUC	GACGGUAUC GAUAAGCU
	50	AUCAAGCU CUGAUGA X GAA AUCGAUAC	GUAUCGAUA AGCUUGAU
	55	UCGAUAUC CUGAUGA X GAA AGCUUAUC	GAUAAGCUU GAUAUCGA
	59	GAAUUCGA CUGAUGA X GAA AUCAAGCU	AGCUUGAUA UCGAAUUC
15	61	CCGAAUUC CUGAUGA X GAA AUAUCAAG	CUUGAUAUC GAAUUCGG
	66	UGGGCCCG CUGAUGA X GAA AUUCGAUA	UAUCGAAUU CGGGCCCA
	67	CUGGGCCC CUGAUGA X GAA AAUUCGAU	AUCGAAUUC GGGCCCAG
	83	GGCUGCGG CUGAUGA X GAA ACACAGUC	GACUGUGUC CCGCAGCC
	97	AGCCAGGU CUGAUGA X GAA AUCCCGGC	GCCGGGAUA ACCUGGCU
20	114	GUCCGCGG CUGAUGA X GAA AUCGGGUC	GACCCGAUU CCGCGGAC
	115	UGUCCGCG CUGAUGA X GAA AAUCGGGU	ACCCGAUUC CGCGGACA
	169	ACCGGGGA CUGAUGA X GAA AGCGCGGG	CCCGCGCUC UCCCCGGU
	171	AGACCGGG CUGAUGA X GAA AGAGCGCG	CGCGCUCUC CCCGGUCU
	178	CAGCGCAA CUGAUGA X GAA ACCGGGGA	UCCCCGGUC UUGCGCUG
25	180	CGCAGCGC CUGAUGA X GAA AGACCGGG	CCCGGUCUU GCGCUGCG
	197	AGAGGCGG CUGAUGA X GAA AUGGCCCC	GGGGCCAUA CCGCCUCU
	204	AAGUCACA CUGAUGA X GAA AGGCGGUA	UACCGCCUC UGUGACUU
	212	CCGCAAAG CUGAUGA X GAA AGUCACAG	CUGUGACUU CUUUGCGG
	213	CCCGCAA CUGAUGA X GAA AAGUCACA	UGUGACUUC UUUGCGGG
30	215	GGCCCGCA CUGAUGA X GAA AGAAGUCA	UGACUUCUU UGCGGGCC

123

216 UGGCCCGC CUGAUGA X GAA AAGAAGUC GACUUCUUU GCGGGCCA
241 CAGGCACA CUGAUGA X GAA ACUCCUUC GAAGGAGUC UGUGCCUG
262 UGGGCACA CUGAUGA X GAA AGCCCAGU ACUGGGCUC UGUGCCCA
306 GCGACAGC CUGAUGA X GAA AGCAGCGC GCGCUGCUA GCUGUCGC
5 312 CACAGAGC CUGAUGA X GAA ACAGCUAG CUAGCUGUC GCUCUGUG
316 GAACCACA CUGAUGA X GAA AGCGACAG CUGUCGCUC UGUGGUUC
323 CCACGCAG CUGAUGA X GAA ACCACAGA UCUGUGGUU CUGCGUGG
324 UCCACGCA CUGAUGA X GAA AACCACAG CUGUGGUUC UGCGUGGA
347 AACCCACA CUGAUGA X GAA AGGCGGCU AGCCGCCUC UGUGGGUU
10 355 GCCAGUCA CUGAUGA X GAA ACCCACAG CUGUGGGUU UGACUGGC
356 CGCCAGUC CUGAUGA X GAA AACCACCA UGUGGGUUU GACUGGCG
367 AUGGAGAA CUGAUGA X GAA AUCGCCAG CUGGCGAUU UUCUCCAU
368 GAUGGAGA CUGAUGA X GAA AAUCGCCA UGGCGAUUU UCUCCAUC
369 GGAUGGAG CUGAUGA X GAA AAAUCGCC GGCGAUUUU CUCCAUCC
15 370 GGAUGGA CUGAUGA X GAA AAAAUCGC GCGAUUUUC UCCAUCCC
372 GGGGGAUG CUGAUGA X GAA AGAAAUC GAUUUUCUC CAUCCCCC
376 CUUGGGGG CUGAUGA X GAA AUGGAGAA UUCUCCAUC CCCCCAAG
387 UGUGUGCU CUGAUGA X GAA AGCUUGGG CCCAAGCUC AGCACACA
405 AUUGUCAG CUGAUGA X GAA AUGUCUUU AAAGACAUU CUGACAAU
20 414 UUUGCCAA CUGAUGA X GAA AUUGUCAG CUGACAAUU UUGGCAAA
415 AUUUGCCA CUGAUGA X GAA AAUUGUCA UGACAAUUU UGGCAAAU
416 UAUUUGCC CUGAUGA X GAA AAUUGUC GACAAUUU GGCAAAUA
424 AAGGGUUG CUGAUGA X GAA AUUUGCCA UGGCAAAUA CAACCCUU
432 GUAAUCUG CUGAUGA X GAA AGGGUUGU ACAACCCUU CAGAUUAC
25 433 AGUAAUCU CUGAUGA X GAA AAGGGUUG CAACCCUUC AGAUUACU
438 CUGCAAGU CUGAUGA X GAA AUCUGAAG CUUCAGAUU ACUUGCAG
439 CCUGCAAG CUGAUGA X GAA AAUCUGAA UUCAGAUUA CUUGCAGG
442 UCCCCUGC CUGAUGA X GAA AGUAAUCU AGAUUACUU GCAGGGGA
471 UUGGGCCA CUGAUGA X GAA AGCCAGUC GACUGGCUU UGGCCCAA
30 472 AUUGGGCC CUGAUGA X GAA AAGCCAGU ACUGGCUUU GGCCCAAU

124

	484	AUCACGCU	CUGAUGA	X	GAA	AGCAUUGG	CCAAUGCUC	AGCGUGAU
	493	UUCCUCAG	CUGAUGA	X	GAA	AUCACGCU	AGCGUGAUU	CUGAGGAA
	494	UUUCCUCA	CUGAUGA	X	GAA	AAUCACGC	GCGUGAUUC	UGAGGAAA
	507	GUCACCAA	CUGAUGA	X	GAA	ACCCUUUC	GAAAGGGUA	UUGGUGAC
5	509	CAGUCACC	CUGAUGA	X	GAA	AUACCCUU	AAGGGUAUU	GGUGACUG
	538	GCAGAAGA	CUGAUGA	X	GAA	ACUGUCAC	GUGACAGUA	UCUUCUGC
	540	UUGCAGAA	CUGAUGA	X	GAA	AUACUGUC	GACAGUAUC	UUCUGCAA
	542	UUUUGCAG	CUGAUGA	X	GAA	AGAUACUG	CAGUAUCUU	CUGCAAAA
	543	GUUUUGCA	CUGAUGA	X	GAA	AAGAUACU	AGUAUCUUC	UGCAAAAC
10	555	GGAAUGGU	CUGAUGA	X	GAA	AGUGUUUU	AAAACACUC	ACCAUUCC
	561	ACCCUGGG	CUGAUGA	X	GAA	AUGGUGAG	CUCACCAUU	CCCAGGGU
	562	CACCCUGG	CUGAUGA	X	GAA	AAUGGUGA	UCACCAUUC	CCAGGGUG
	573	UCAUUUCC	CUGAUGA	X	GAA	ACCACCCU	AGGGUGGUU	GGAAAUGA
	583	GGCUCCAG	CUGAUGA	X	GAA	AUCAUUUC	GAAAUGAUA	CUGGAGCC
15	593	AGCAUUG	CUGAUGA	X	GAA	AGGCUCCA	UGGAGCCUA	CAAGUGCU
	602	CCCGGUAC	CUGAUGA	X	GAA	AGCACUUG	CAAGUGCUC	GUACCGGG
	605	CGUCCCGG	CUGAUGA	X	GAA	ACGAGCAC	GUGCUCGUA	CCGGGACG
	615	GCUAUGUC	CUGAUGA	X	GAA	ACGUCCCG	CGGGACGUC	GACAUAGC
	621	GUGGAGGC	CUGAUGA	X	GAA	AUGUCGAC	GUCGACAUU	GCCUCCAC
20	626	AAACAGUG	CUGAUGA	X	GAA	AGGCUAUG	CAUAGCCUC	CACUGUUU
	633	UAGACAUU	CUGAUGA	X	GAA	ACAGUGGA	UCCACUGUU	UAUGUCUA
	634	AUAGACAU	CUGAUGA	X	GAA	AACAGUGG	CCACUGUUU	AUGUCUAU
	635	CAUAGACA	CUGAUGA	X	GAA	AAACAGUG	CACUGUUUA	UGUCUAUG
	639	CGAACAUU	CUGAUGA	X	GAA	ACAUAAAC	GUUUUUGUC	UAUGUUCG
25	641	CUCGAACA	CUGAUGA	X	GAA	AGACAUAA	UUAUGUCUA	UGUUCGAG
	645	UAAUCUCG	CUGAUGA	X	GAA	ACAUAGAC	GUCUAUGUU	CGAGAUUA
	646	GUAAUCUC	CUGAUGA	X	GAA	AACAUAGA	UCUAUGUUC	GAGAUUAC
	652	UGAUCUGU	CUGAUGA	X	GAA	AUCUCGAA	UUCGAGAUU	ACAGAUCA
	653	GUGAUCUG	CUGAUGA	X	GAA	AAUCUCGA	UCGAGAUUA	CAGAUAC
30	659	UGAAUGGU	CUGAUGA	X	GAA	AUCUGUAA	UUACAGAUU	ACCAUUCA

125

665 AGGCGAUG CUGAUGA X GAA AUGGUGAU AUCACCAUJ CAUCGCCU
666 GAGGCGAU CUGAUGA X GAA AAUGGUGA UCACCAUUC AUCGCCUC
669 ACAGAGGC CUGAUGA X GAA AUGAAUGG CCAUUCAUC GCCUCUGU
674 CACUGACA CUGAUGA X GAA AGGCGAUG CAUCGCCUC UGUCAGUG
5 678 UGGUCACU CUGAUGA X GAA ACAGAGGC GCCUCUGUC AGUGACCA
696 AUGUACAC CUGAUGA X GAA AUGCCAUG CAUGGCAUC GUGUACAU
701 CGGUGAUG CUGAUGA X GAA ACACGAUG CAUCGUGUA CAUCACCG
705 UUCUCGGU CUGAUGA X GAA AUGUACAC GUGUACAUC ACCGAGAA
735 CGGCAGGG CUGAUGA X GAA AUCACCAC GUGGUGAUC CCCUGCCG
10 749 UUGAAAUC CUGAUGA X GAA ACCCUCGG CCGAGGGUC GAUUUCA
753 AGGUUUGA CUGAUGA X GAA AUCGACCC GGUUCGAUU UCAAACCU
754 GAGGUUUG CUGAUGA X GAA AAUCGACC GGUCGAUUU CAAACCUC
755 UGAGGUUU CUGAUGA X GAA AAAUCGAC GUCGAUUUC AAACCUCA
762 GACACAUU CUGAUGA X GAA AGGUUUGA UCAAACCUC AAUGUGUC
15 770 CGCAAAGA CUGAUGA X GAA ACACAUUG CAAUGUGUC UCUUUGCG
772 AGCGCAA CUGAUGA X GAA AGACACAU AUGUGUCUC UUUGCGCU
774 CUAGCGCA CUGAUGA X GAA AGAGACAC GUGUCUCUU UGCGCUAG
775 CCUAGCGC CUGAUGA X GAA AAGAGACA UGUCUCUUU GCGCUAGG
781 UGGAUACC CUGAUGA X GAA AGCGCAA UUUGCGCUA GUAUCCA
20 785 UUUUCUGA CUGAUGA X GAA ACCUAGCG CGCUAGGUA UCCAGAAA
787 CUUUUCUG CUGAUGA X GAA AUACCUAG CUAGGUAUC CAGAAAAG
800 CCGGAACA CUGAUGA X GAA AUCUCUUU AAAGAGAUU UGUUCCGG
801 UCCGGAAC CUGAUGA X GAA AAUCUCUU AAGAGAUUU GUUCCGGA
804 CCAUCCGG CUGAUGA X GAA ACAAUCU AGAUUUGUU CCGGAUGG
25 805 UCCAUCCG CUGAUGA X GAA AACAAAUC GAUUUGUUC CGGAUGGA
822 UCCCAGGA CUGAUGA X GAA AUUCUGUU AACAGAAUU UCCUGGGA
823 GUCCCAGG CUGAUGA X GAA AAUUCUGU ACAGAAUUU CCUGGGAC
824 UGUCCCAG CUGAUGA X GAA AAAUUCUG CAGAAUUUC CUGGGACA
840 GUAAAGCC CUGAUGA X GAA AUCUCGCU AGCGAGUA GGUUUUAC
30 845 GGAGAGUA CUGAUGA X GAA AGCCUAC GAUAGGCUU UACUCUCC

	846	GGGAGAGU	CUGAUGA	X	GAA	AAGCCUAU	AUAGGCUUU	ACUCUCCC
	847	GGGGAGAG	CUGAUGA	X	GAA	AAAGCCUA	UAGGCUUUA	CUCUCCCC
	850	ACUGGGGA	CUGAUGA	X	GAA	AGUAAAGC	GCUUUACUC	UCCCCAGU
	852	UAAUCUGG	CUGAUGA	X	GAA	AGAGUAAA	UUUACUCUC	CCCAGUUA
5	859	GAUCAUGU	CUGAUGA	X	GAA	ACUGGGGA	UCCCCAGUU	ACAUGAUC
	860	UGAUCAUG	CUGAUGA	X	GAA	AACUGGGG	CCCCAGUUA	CAUGAUCA
	867	GCAUAGCU	CUGAUGA	X	GAA	AUCAUGUA	UACAUGAUC	AGCUAUGC
	872	UGCCGGCA	CUGAUGA	X	GAA	AGCUGAUC	GAUCAGCUA	UGCCGGCA
	885	UCACAGAA	CUGAUGA	X	GAA	ACCAUGCC	GGCAUGGUC	UUCUGUGA
10	887	CCUCACAG	CUGAUGA	X	GAA	AGACCAUG	CAUGGUCUU	CUGUGAGG
	888	GCCUCACA	CUGAUGA	X	GAA	AAGACCAU	AUGGUCUUC	UGUGAGGC
	903	UCAUCAUU	CUGAUGA	X	GAA	AUCUUUGC	GCAAAGAUC	AAUGAUGA
	917	UAGACUGA	CUGAUGA	X	GAA	AGGUUUCA	UGAAACCUA	UCAGUCUA
	919	GAUAGACU	CUGAUGA	X	GAA	AUAGGUUU	AAACCUAUC	AGUCUAUC
15	923	ACAUGAUA	CUGAUGA	X	GAA	ACUGAUAG	CUAUCAGUC	UAUCAUGU
	925	GUACAUGA	CUGAUGA	X	GAA	AGACUGAU	AUCAGUCUA	UCAUGUAC
	927	AUGUACAU	CUGAUGA	X	GAA	AUAGACUG	CAGUCUAUC	AUGUACAU
	932	CAACUAUG	CUGAUGA	X	GAA	ACAUGAUA	UAUCAUGUA	CAUAGUUG
	936	ACCACAAC	CUGAUGA	X	GAA	AUGUACAU	AUGUACAU	GUUGUGGU
20	939	ACAACCAC	CUGAUGA	X	GAA	ACUAUGUA	UACAUAGUU	GUGGUUGU
	945	UAUCCUAC	CUGAUGA	X	GAA	ACCACAAC	GUUGUGGUU	GUAGGAUA
	948	CUAUAUCC	CUGAUGA	X	GAA	ACAACCAC	GUGGUUGUA	GGAUUAUG
	953	AAAUCCUA	CUGAUGA	X	GAA	AUCCUACA	UGUAGGAUA	UAGGAUUU
	955	AUAAAUCC	CUGAUGA	X	GAA	AUAUCCUA	UAGGAUAUA	GGAUUUAU
25	960	ACAUCAUA	CUGAUGA	X	GAA	AUCCUAUA	UAUAGGAUU	UAUGAUGU
	961	CACAUCAU	CUGAUGA	X	GAA	AAUCCUAU	AUAGGAUUU	AUGAUGUG
	962	UCACAUCA	CUGAUGA	X	GAA	AAAUCCUA	UAGGAUUUA	UGAUGUGA
	972	GGGCUCAG	CUGAUGA	X	GAA	AUCACAUC	GAUGUGAUU	CUGAGCCC
	973	GGGGCUCA	CUGAUGA	X	GAA	AAUCACAU	AUGUGAUUC	UGAGCCCC
30	993	GAUAGCUC	CUGAUGA	X	GAA	AUUUCAUG	CAUGAAAUU	GAGCUAUC

999 CCGGCAGA CUGAUGA X GAA AGCUCAAU AUUGAGCUA UCUGCCGG
1001 CUCCGGCA CUGAUGA X GAA AUAGCUCA UGAGCUAUC UGCCGGAG
1017 UUAAGAC CUGAUGA X GAA AGUUUUUC GAAAAACUU GUCUUA
1020 CAAUUUAA CUGAUGA X GAA ACAAGUUU AAACUUGUC UUAUUUG
5 1022 UACAAUUU CUGAUGA X GAA AGACAAGU ACUUGUCUU AAAUUGUA
1023 GUACAAUU CUGAUGA X GAA AAGACAAG CUUGUCUUA AAUUGUAC
1027 CGCUGUAC CUGAUGA X GAA AUUUAAGA UCUUAAAUU GUACAGCG
1030 UCUCGCUG CUGAUGA X GAA ACAAUUUA UAAAUUGUA CAGCGAGA
1047 CCCACAUU CUGAUGA X GAA AGCUCUGU ACAGAGCUC AAUGUGGG
10 1059 GUGAAAUC CUGAUGA X GAA AGCCCCAC GUGGGGCUU GAUUUCAC
1063 CCAGGUGA CUGAUGA X GAA AUCAAGCC GGCUUGAUU UCACCUGG
1064 GCCAGGUG CUGAUGA X GAA AAUCAAGC GCUUGAUUU CACCUGGC
1065 UGCCAGGU CUGAUGA X GAA AAUCAAG CUUGAUUUC ACCUGGCA
1076 AAGGUGGA CUGAUGA X GAA AGUGCCAG CUGGCACUC UCCACCUU
15 1078 UGAAGGUG CUGAUGA X GAA AGAGUGCC GGCACUCUC CACCUUCA
1084 AGACUUUG CUGAUGA X GAA AGGUGGAG CUCCACCUU CAAAGUCU
1085 GAGACUUU CUGAUGA X GAA AAGGUGGA UCCACCUUC AAAGUCUC
1091 UAUGAUGA CUGAUGA X GAA ACUUUGAA UUCAAGUC UCAUCAUA
1093 CUUAUGAU CUGAUGA X GAA AGACUUUG CAAAGUCUC AUCAUAAG
20 1096 CUUCUUAU CUGAUGA X GAA AUGAGACU AGUCUCAUC AUAAGAAG
1099 AAUCUUCU CUGAUGA X GAA AUGAUGAG CUCAUCAUA AGAAGAUU
1107 CGGUUUAC CUGAUGA X GAA AUCUUCUU AAGAAGAUU GUAAACCG
1110 UCCCCGUU CUGAUGA X GAA ACAAUUCU AAGAUUGUA AACCGGGA
1130 UCCCAGGA CUGAUGA X GAA AGGGUUUC GAAACCCUU UCCUGGGA
25 1131 GUCCCAGG CUGAUGA X GAA AAGGGUUU AAACCCUUU CCUGGGAC
1132 AGUCCCAG CUGAUGA X GAA AAAGGGUU AACCUCUUC CUGGGACU
1154 UGCUCAA CUGAUGA X GAA ACAUCUUC GAAGAUGUU UUUGAGCA
1155 GUGCUCAA CUGAUGA X GAA AACAUUCU AAGAUGUUU UUGAGCAC
1156 GGUGCUCA CUGAUGA X GAA AAACAUCU AAGAUGUUU UGAGCACC
30 1157 AGGUGCUC CUGAUGA X GAA AAAACAUC GAUGUUUUU GAGCACC

1166 CUAUUGUC CUGAUGA X GAA AGGUGCUC GAGCACCUU GACAAUAG
1173 ACACUUUC CUGAUGA X GAA AUUGUCAA UUGACAAUA GAAAGUGU
1205 CACAGGUG CUGAUGA X GAA AUUCCCCU AGGGGAAUA CACCUGUG
1215 CUGGACGC CUGAUGA X GAA ACACAGGU ACCUGUGUA GCGUCCAG
5 1220 GUCCACUG CUGAUGA X GAA ACGCUACA UGUAGCGUC CAGUGGAC
1236 UUUCUCUU CUGAUGA X GAA AUCAUCCG CGGAUGAUC AAGAGAAA
1246 AAAUGUUC CUGAUGA X GAA AUUUCUCU AGAGAAUA GAACAUUU
1253 CUCGGACA CUGAUGA X GAA AUGUUCUA UAGAACAUI UGUCCGAG
1254 ACUCGGAC CUGAUGA X GAA AAUGUUCU AGAACAUIU GUCCGAGU
10 1257 UGAACUCG CUGAUGA X GAA ACAA AUGU ACAUIUGUC CGAGUUCA
1263 UUUGUGUG CUGAUGA X GAA ACUCGGAC GUCCGAGUU CACACAAA
1264 CUUUGUGU CUGAUGA X GAA AACUCGGA UCCGAGUUC ACACAAAG
1276 AGCAAUA CUGAUGA X GAA AGGCUUUG CAAAGCCUU UUAUUGCU
1277 AAGCAAUA CUGAUGA X GAA AAGGCUUU AAAGCCUUU UAUUGCUU
15 1278 AAAGCAAU CUGAUGA X GAA AAAGGCUU AAGCCUUU AUUGCUUU
1279 GAAAGCAA CUGAUGA X GAA AAAAGGCU AGCCUUUUA UUGCUUUC
1281 CCGAAAGC CUGAUGA X GAA AUAAAAGG CCUUUUUAU GCUUUCGG
1285 ACUACCGA CUGAUGA X GAA AGCAAUA UUAUUGCUU UCGGUAGU
1286 CACUACCG CUGAUGA X GAA AAGCAAUA UAUUGCUUU CGGUAGUG
20 1287 CCACUACC CUGAUGA X GAA AAAGCAAU AUUGCUUUC GGUAGUGG
1291 CAUCCAC CUGAUGA X GAA ACCGAAAG CUUUCGGUA GUGGGAUG
1304 CCACCAA CUGAUGA X GAA AUUUCAUC GAUGAAUUC UUUGGUGG
1306 UCCACCA CUGAUGA X GAA AGAUUCA UGAAAUUU UGGUGGAA
1307 CUUCCACC CUGAUGA X GAA AAGAUUUC GAAAUUUU GGUGGAAG
25 1330 UCGGACUU CUGAUGA X GAA ACUGCCCA UGGGCAGUC AAGUCCGA
1335 GGGAUUCG CUGAUGA X GAA ACUUGACU AGUCAAGUC CGAAUCCC
1341 UUCACAGG CUGAUGA X GAA AUUCGGAC GUCCGAAUC CCUGUGAA
1352 AACUGAGA CUGAUGA X GAA ACUUCACA UGUGAAGUA UCUCAGUU
1354 GUAACUGA CUGAUGA X GAA AUACUUA UGAAGUAUC UCAGUUAC
30 1356 GGGUAACU CUGAUGA X GAA AGAUACUU AAGUAUCUC AGUUACCC

1360 AGCUGGGU CUGAUGA X GAA ACUGAGAU AUCUCAGUU ACCCAGCU
1361 GAGCUGGG CUGAUGA X GAA AACUGAGA UCUCAGUUA CCCAGCUC
1369 GAUAUCAG CUGAUGA X GAA AGCUGGGU ACCCAGCUC CUGAUUUC
1375 CCAUUUGA CUGAUGA X GAA AUCAGGAG CUCCUGAUA UCAAAUGG
5 1377 UACCAUUU CUGAUGA X GAA AUAUCAGG CCUGAUUUC AAAUGGUA
1385 CAUUUCUG CUGAUGA X GAA ACCAUUUG CAAAUGGUA CAGAAAUG
1404 UUGGACUC CUGAUGA X GAA AUGGGCCU AGGCCCAUU GAGUCCAA
1409 UGUAGUUG CUGAUGA X GAA ACUCAUUG CAUUGAGUC CAACUACA
1415 UCAUUGUG CUGAUGA X GAA AGUUGGAC GUCCAACUA CACAAUGA
10 1425 UCGCCAAC CUGAUGA X GAA AUCAUUGU ACAAUGAUU GUUGGCCA
1428 UCAUCGCC CUGAUGA X GAA ACAUUCAU AUGAUUGUU GGCGAUGA
1440 AUGAUGGU CUGAUGA X GAA AGUUCAUC GAUGAACUC ACCAUCAU
1446 ACUUCCAU CUGAUGA X GAA AUGGUGAG CUCACCAUC AUGGAAGU
1478 UGACCGUG CUGAUGA X GAA AGUUUCCU AGGAAACUA CACGGUCA
15 1485 GUGAGGAU CUGAUGA X GAA ACCGUGUA UACACGGUC AUCCUCAC
1488 UUGGUGAG CUGAUGA X GAA AUGACCGU ACGGUCAUC CUCACCAA
1491 GGGUUGGU CUGAUGA X GAA AGGAUGAC GUCAUCCUC ACCAACCC
1503 UCCAUUGA CUGAUGA X GAA AUGGGGUU AACCCCAUU UCAAUGGA
1504 CUCCAUUG CUGAUGA X GAA AAUGGGGU ACCCCAUUU CAAUGGAG
20 1505 UCUCCAUU CUGAUGA X GAA AAAUGGGG CCCC AUUUC AAUGGAGA
1530 ACCAGAGA CUGAUGA X GAA ACCAUGUG CACAUGGUC UCUCUGGU
1532 CAACCAGA CUGAUGA X GAA AGACCAUG CAUGGUCUC UCUGGUUG
1534 CACAACCA CUGAUGA X GAA AGAGACCA UGGUCUCUC UGGUUGUG
1539 ACAUUCAC CUGAUGA X GAA ACCAGAGA UCUCUGGUU GUGAAUGU
25 1548 UGGGGUGG CUGAUGA X GAA ACAUUCAC GUGAAUGUC CCACCCCA
1560 UUCUCACC CUGAUGA X GAA AUCUGGGG CCCCAGAUU GGUGAGAA
1574 GCGAGAUU CUGAUGA X GAA AGGCUUUC GAAAGCCUU GAUCUCGC
1578 AUAGGCGA CUGAUGA X GAA AUCAAGGC GCCUUGAUC UCGCCUUA
1580 CCAUAGGC CUGAUGA X GAA AGAUCAAG CUUGAUCUC GCCUAUGG
30 1585 GGAAUCCA CUGAUGA X GAA AGGCGAGA UCUCGCCUA UGGAUUC

130

	1591	CUGGUAGG	CUGAUGA	X	GAA	AUCCAUAG	CUAUGGAUU	CCUACCAG
	1592	ACUGGUAG	CUGAUGA	X	GAA	AAUCCAUA	UAUGGAUUC	CUACCAGU
	1595	CAUACUGG	CUGAUGA	X	GAA	AGGAAUCC	GGAUUCCUA	CCAGUAUG
	1601	UGGUCCCA	CUGAUGA	X	GAA	ACUGGUAG	CUACCAGUA	UGGGACCA
5	1619	UGCAUGUC	CUGAUGA	X	GAA	AUGUCUGC	GCAGACAUU	GACAUGCA
	1632	UUGGCGUA	CUGAUGA	X	GAA	ACUGUGCA	UGCACAGUC	UACGCCAA
	1634	GGUUGGCG	CUGAUGA	X	GAA	AGACUGUG	CACAGUCUA	CGCCAACC
	1645	GUGCAGGG	CUGAUGA	X	GAA	AGGGUUGG	CCAACCCUC	CCCUGCAC
	1659	UACCACUG	CUGAUGA	X	GAA	AUGUGGUG	CACCACAUC	CAGUGGUA
10	1667	GCUGCCAG	CUGAUGA	X	GAA	ACCACUGG	CCAGUGGUA	CUGGCAGC
	1677	GCUUCUUC	CUGAUGA	X	GAA	AGCUGCCA	UGGCAGCUA	GAAGAAGC
	1691	GUCUGUAG	CUGAUGA	X	GAA	AGCAGGCU	AGCCUGCUC	CUACAGAC
	1694	CGGGUCTUG	CUGAUGA	X	GAA	AGGAGCAG	CUGCUCUA	CAGACCCG
	1718	UACAAGCA	CUGAUGA	X	GAA	ACGGGCUU	AAGCCCGUA	UGCUUGUA
15	1723	UUCUUUAC	CUGAUGA	X	GAA	AGCAUACG	CGUAUGCUU	GUAAAGAA
	1726	CCAUUCUU	CUGAUGA	X	GAA	ACAAGCAU	AUGCUUGUA	AAGAAUGG
	1750	CCCCUGGA	CUGAUGA	X	GAA	AUCCUCCA	UGGAGGAUU	UCCAGGGG
	1751	CCCCCUGG	CUGAUGA	X	GAA	AAUCCUCC	GGAGGAUUU	CCAGGGGG
	1752	CCCCCUG	CUGAUGA	X	GAA	AAUCCUC	GAGGAUUUC	CAGGGGGG
20	1770	GUGACUUC	CUGAUGA	X	GAA	AUCUUGUU	AACAAGAUC	GAAGUCAC
	1776	UUUUUGGU	CUGAUGA	X	GAA	ACUUCGAU	AUCGAAGUC	ACCAAAAA
	1790	UCAGGGCA	CUGAUGA	X	GAA	AUUGGUUU	AAACCAUA	UGCCUGA
	1800	UUUCCUUC	CUGAUGA	X	GAA	AUCAGGGC	GCCUGAUU	GAAGGAAA
	1821	AGCGUACU	CUGAUGA	X	GAA	ACAGUUUU	AAAACUGUA	AGUACGCU
25	1825	GACCAGCG	CUGAUGA	X	GAA	ACUUACAG	CUGUAAGUA	CGCUGGUC
	1833	GCUUGGAU	CUGAUGA	X	GAA	ACCAGCGU	ACGCUGGUC	AUCCAAGC
	1836	GCAGCUUG	CUGAUGA	X	GAA	AUGACCAG	CUGGUCAUC	CAAGCUGC
	1853	ACAACGCU	CUGAUGA	X	GAA	ACACGUUG	CAACGUGUC	AGCGUUGU
	1859	AUUUGUAC	CUGAUGA	X	GAA	ACGCUGAC	GUCAGCGUU	GUACAAAU
30	1862	CACAUUUG	CUGAUGA	X	GAA	ACAACGCU	AGCGUUGUA	CAAUGUG

1878 GCUUUGUU CUGAUGA X GAA AUGGCUUC GAAGCCAUC AACAAAGC
1905 AAGGAGAU CUGAUGA X GAA ACCCUCUC GAGAGGGUC AUCUCCUU
1908 UGGAAGGA CUGAUGA X GAA AUGACCCU AGGGUCAUC UCCUUCCA
1910 CAUGGAAG CUGAUGA X GAA AGAUGACC GGUCAUCUC CUUCCAUG
5 1913 UCACAUGG CUGAUGA X GAA AGGAGAUG CAUCUCCUU CCAUGUGA
1914 AUCACAUG CUGAUGA X GAA AAGGAGAU AUCUCCUUC CAUGUGAU
1923 GGACCCCU CUGAUGA X GAA AUCACAUG CAUGUGAUC AGGGGUCC
1930 AAUUUCAG CUGAUGA X GAA ACCCCUGA UCAGGGGUC CUGAAAUU
1938 UGCACAGU CUGAUGA X GAA AUUUCAGG CCUGAAAUU ACUGUGCA
10 1939 UUGCACAG CUGAUGA X GAA AAUUUCAG CUGAAAUUA CUGUGCAA
1982 ACAACAGG CUGAUGA X GAA ACACACUC GAGUGUGUC CCUGUUGU
1988 CAGUGCAC CUGAUGA X GAA ACAGGGAC GUCCCUGUU GUGCACUG
2008 CUCAAACG CUGAUGA X GAA AUUUCUGU ACAGAAUA CGUUUGAG
2012 GGUUCUCA CUGAUGA X GAA ACGUAUUU AAAUACGUU UGAGAACC
15 2013 AGGUUCUC CUGAUGA X GAA AACGUAUU AAUACGUU GAGAACCU
2022 UACCACGU CUGAUGA X GAA AGGUUCUC GAGAACCUC ACGUGGUA
2030 CAAGCUUG CUGAUGA X GAA ACCACGUG CACGUGGUA CAAGCUUG
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20 2054 UGUGGACC CUGAUGA X GAA AUGUUGCC GGCAACAUC GGUCCACA
2058 CCAUGUG CUGAUGA X GAA ACCGAUGU ACAUCGGUC CACAUGGG
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2076 ACUGGUGU CUGAUGA X GAA AGUGAUUC GAAUCACUC ACACCAGU
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25 2086 GUUCUUGC CUGAUGA X GAA AACUGGUG CACCAGUUU GCAAGAAC
2096 GAGCAUCC CUGAUGA X GAA AGUUCUUG CAAGAACUU GGAUGCUC
2104 UUUCCAAA CUGAUGA X GAA AGCAUCCA UGGAUGCUC UUUGGAAA
2106 AGUUUCCA CUGAUGA X GAA AGAGCAUC GAUGCUCUU UGGAACU
2107 CAGUUUCC CUGAUGA X GAA AAGAGCAU AUGCUCUUU GGAAACUG
30 2129 UGUUAGAA CUGAUGA X GAA ACAUGGUG CACCAUGUU UUCUAACA

	2130	CUGUUAGA	CUGAUGA	X	GAA	AACAUGGU	ACCAUGUUU	UCUAAACAG
	2131	GCUGUUAG	CUGAUGA	X	GAA	AAACAUGG	CCAUGUUUU	CUAACAGC
	2132	UGCUGUUA	CUGAUGA	X	GAA	AAAACAUG	CAUGUUUUC	UAACAGCA
	2134	UGUGCUGU	CUGAUGA	X	GAA	AGAAAACA	UGUUUUCUA	ACAGCACA
5	2151	ACAAUCAA	CUGAUGA	X	GAA	AUGUCAUU	AAUGACAUC	UUGAUUGU
	2153	CCACAAUC	CUGAUGA	X	GAA	AGAUGUCA	UGACAUCUU	GAUUGUGG
	2157	AAUGCCAC	CUGAUGA	X	GAA	AUCAAGAU	AUCUUGAUU	GUGGCAUU
	2165	CAUUCUGA	CUGAUGA	X	GAA	AUGCCACA	UGUGGCAUU	UCAGAAUG
	2166	GCAUUCUG	CUGAUGA	X	GAA	AAUGCCAC	GUGGCAUUU	CAGAAUGC
10	2167	GGCAUUCU	CUGAUGA	X	GAA	AAAUGCCA	UGGCAUUUC	AGAAUGCC
	2177	CCUGCAGA	CUGAUGA	X	GAA	AGGCAUUC	GAAUGCCUC	UCUGCAGG
	2179	GUCCUGCA	CUGAUGA	X	GAA	AGAGGCAU	AUGCCUCUC	UGCAGGAC
	2198	AGCAAACA	CUGAUGA	X	GAA	AGUCGCCU	AGGCGACUA	UGUUUGCU
	2202	GCAGAGCA	CUGAUGA	X	GAA	ACAUAGUC	GACUAUGUU	UGCUCUGC
15	2203	AGCAGAGC	CUGAUGA	X	GAA	AACAUAGU	ACUAUGUUU	GCUCUGCU
	2207	CUUGAGCA	CUGAUGA	X	GAA	AGCAAACA	UGUUUGCUC	UGCUCAGG
	2212	CUUAUCUU	CUGAUGA	X	GAA	AGCAGAGC	GCUCUGCUC	AAGAUAGG
	2218	GGUCUUCU	CUGAUGA	X	GAA	AUCUUGAG	CUCAAGAUU	AGAAGACC
	2239	GACCAGGC	CUGAUGA	X	GAA	AUGUCUUU	AAAGACAUU	GCCUGGUC
20	2247	AGCUGUUU	CUGAUGA	X	GAA	ACCAGGCA	UGCCUGGUC	AAACAGCU
	2256	AGGAUGAU	CUGAUGA	X	GAA	AGCUGUUU	AAACAGCUC	AUCAUCCU
	2259	UCUAGGAU	CUGAUGA	X	GAA	AUGAGCUG	CAGCUCAUC	AUCCUAGA
	2262	CGCUCUAG	CUGAUGA	X	GAA	AUGAUGAG	CUCAUCAUC	CUAGAGCG
	2265	AUGCGCUC	CUGAUGA	X	GAA	AGGAUGAU	AUCAUCCUA	GAGCGCAU
25	2286	UUUCCGGU	CUGAUGA	X	GAA	AUCAUGGG	CCCAUGAUC	ACCGGAAA
	2296	AUUCUCCA	CUGAUGA	X	GAA	AUUUCCGG	CCGGAUAUC	UGGAGAAU
	2305	UGUUGUCU	CUGAUGA	X	GAA	AUUCUCCA	UGGAGAAUC	AGACAACA
	2319	GUCUCGCC	CUGAUGA	X	GAA	AUGGUUGU	ACAACCAUU	GGCGAGAC
	2331	GUCACUUC	CUGAUGA	X	GAA	AUGGUCUC	GAGACCAUU	GAAGUGAC
30	2341	UGCUGGGC	CUGAUGA	X	GAA	AGUCACUU	AAGUGACUU	GCCCAGCA

2351 GAUUUCCA CUGAUGA X GAA AUGCUGGG CCCAGCAUC UGGAAAUC
2359 UGGGGUAG CUGAUGA X GAA AUUUCAG CUGGAAAUC CUACCCCA
2362 GUGUGGGG CUGAUGA X GAA AGGAUUUC GAAAUCCUA CCCACAC
2373 AACCAUGU CUGAUGA X GAA AUGUGUGG CCACACAUU ACAUGGUU
5 2374 GAACCAUG CUGAUGA X GAA AAUGUGUG CACACAUUA CAUGGUUC
2381 UGUCUUUG CUGAUGA X GAA ACCAUGUA UACAUGGUU CAAAGACA
2382 UUGUCUUU CUGAUGA X GAA AACCAUGU ACAUGGUUC AAAGACAA
2403 GAAUCUUC CUGAUGA X GAA ACCAGGGU ACCUGGUA GAAGAUUC
2410 AAUGCCUG CUGAUGA X GAA AUCUUCUA UAGAAGAUU CAGGCAUU
10 2411 CAAUGCCU CUGAUGA X GAA AAUCUUCU AGAAGAUUC AGGCAUUG
2418 CUCAGUAC CUGAUGA X GAA AUGCCUGA UCAGGCAUU GUACUGAG
2421 UCUCUCAG CUGAUGA X GAA ACAUGCC GGCAUUGUA CUGAGAGA
2449 CCUGCGGA CUGAUGA X GAA AGUCAGGU ACCUGACUA UCCGCAGG
2451 ACCUGCG CUGAUGA X GAA AUAGUCAG CUGACUAUC CGCAGGGU
15 2481 CAGGUGUA CUGAUGA X GAA AGGCCUCC GGAGGCCUC UACACCUG
2483 GGCAGGUG CUGAUGA X GAA AGAGGCCU AGGCCUCUA CACCUGCC
2505 CAGCCAAG CUGAUGA X GAA ACAUUGCA UGCA AUGUC CUUGGCUG
2508 GCACAGCC CUGAUGA X GAA AGGACAUU AAUGUCCU GGCUGUGC
2532 AUUAUGAA CUGAUGA X GAA AGCGUCUC GAGACGCUC UUCAUAAU
20 2534 CUAUUAUG CUGAUGA X GAA AGAGCGUC GACGCUCU CAUAAUAG
2535 UCUAUUAU CUGAUGA X GAA AAGAGCGU ACGCUCUUC AUAAUAGA
2538 CCUUCUAU CUGAUGA X GAA AUGAAGAG CUCUUCUA AUAGAAGG
2541 GCACCUUC CUGAUGA X GAA AUUAUGAA UUCAUAAU GAAGGUGC
2567 UGACUUC CUGAUGA X GAA AGUUGGUC GACCAACU GGAAGUCA
25 2574 AGGAUAAU CUGAUGA X GAA ACUCCAA UUGGAAGUC AUUAUCCU
2577 ACGAGGAU CUGAUGA X GAA AUGACUUC GAAGUCAU AUCCUCGU
2578 GACGAGGA CUGAUGA X GAA AAUGACU AAGUCAUUA UCCUCGUC
2580 CCGACGAG CUGAUGA X GAA AUAAUGAC GUCAUUAUC CUCGUCGG
2583 GUGCCGAC CUGAUGA X GAA AGGAUAAU AUUAUCCUC GUCGGCAC
30 2586 GCAGUGCC CUGAUGA X GAA ACGAGGAU AUCCUCGUC GGCACUGC

2601 AAC AUGGC CUGAUGA X GAA AUCACUGC GCAGUGAUU GCCAUGUU
2609 GCCAGAAG CUGAUGA X GAA ACAUGGCA UGCCAUGUU CUUCUGGC
2610 AGCCAGAA CUGAUGA X GAA AAC AUGGC GCCAUGUUC UUCUGGCU
2612 GGAGCCAG CUGAUGA X GAA AGAAC AUG CAUGUUCUU CUGGCUCC
5 2613 AGGAGCCA CUGAUGA X GAA AAGAACAU AUGUUCUUC UGGCUCCU
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2622 AUGACAAG CUGAUGA X GAA AGGAGCCA UGGCUCCUU CUUGUCAU
2623 AAUGACAA CUGAUGA X GAA AAGGAGCC GGCUCCUUC UUGUCAUU
2625 ACA AUGAC CUGAUGA X GAA AGAAGGAG CUCCUUCUU GUCAUUGU
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2634 GUCCGUAG CUGAUGA X GAA ACA AUGAC GUCAUUGUC CUACGGAC
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20 2691 UCCAUGAC CUGAUGA X GAA AUAGACAA UUGUCUUAU GUCAUGGA
2694 GGAUCCAU CUGAUGA X GAA ACAAUAGA UCUAUUGUC AUGGAUCC
2701 UUCAUCUG CUGAUGA X GAA AUCCAUGA UCAUGGAUC CAGAUGAA
2711 CCAAGGGC CUGAUGA X GAA AUUCAUCU AGAUGAAUU GCCCUUGG
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25 2738 CAUAAGGC CUGAUGA X GAA AGCGUUCA UGAACGCUU GCCUUAUG
2743 GGCAUCAU CUGAUGA X GAA AGGCAAGC GCUUGCCUU AUGAUGCC
2744 UGGCAUCA CUGAUGA X GAA AAGGCAAG CUUGCCUUA UGAUGCCA
2765 CCCUGGGG CUGAUGA X GAA AUUCCCAC GUGGGAAUU CCCAGGG
2766 UCCCUGGG CUGAUGA X GAA AAUUCCCA UGGGAAUUC CCCAGGGA
30 2787 GGUUUUCC CUGAUGA X GAA AGUUUCAG CUGAAACUA GGAAAACC

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2797 GCGGCCAA CUGAUGA X GAA AGGUUUUC GAAAACCUC UUGGCCGC
2799 CCGCGGCC CUGAUGA X GAA AGAGGUUU AAACCUCUU GGCCGCGG
2813 CUUGGCCG CUGAUGA X GAA AGGCACCG CGGUGCCUU CGGCCAAG
2814 ACUUGGCC CUGAUGA X GAA AAGGCACC GGUGCCUUC GGCCAAGU
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3114 CCCUGGCG CUGAUGA X GAA AAGCGUGC GCACGCUUC CGCCAGGG
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3146 GAUCCACG CUGAUGA X GAA AGAGCUCC GGAGCUCUC CGUGGAUC
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4408 GUGGUGGA CUGAUGA X GAA AGAACAAC GUUGUUCUU UCCACCAC
25 4409 GGUGGUGG CUGAUGA X GAA AAGAACAA UUGUUCUUU CCACCACC
4410 GGGUGGUG CUGAUGA X GAA AAAGAACA UGUUCUUUC CACCACCC
4425 AAUGUGGC CUGAUGA X GAA ACUUCGG CCGGAAGUA GCCACAUU
4433 GAAAAUCA CUGAUGA X GAA AUGUGGCU AGCCACAUU UGAUUUUC
4434 UGAAAAUC CUGAUGA X GAA AAUGUGGC GCCACAUU GAUUUUA
30 4438 AAAAUGAA CUGAUGA X GAA AUCAAAUG CAUUUGAUU UUCAUUU

143

4439 AAAAAUGA CUGAUGA X GAA AAUCAAU AUUUGAUUU UCAUUUUU
4440 CAAAAAUG CUGAUGA X GAA AAAUCAAA UUUGAUUUU CAUUUUUG
4441 CCAAAAAU CUGAUGA X GAA AAAAUCAA UUGAUUUUC AUUUUUGG
4444 CCUCCAAA CUGAUGA X GAA AUGAAAAU AUUUUCAUU UUUGGAGG
5 4445 UCCUCCAA CUGAUGA X GAA AAUGAAAA UUUUCAUUU UUGGAGGA
4446 CUCCUCCA CUGAUGA X GAA AAAUGAAA UUUCAUUUU UGGAGGAG
4447 CCUCCUCC CUGAUGA X GAA AAAAUGAA UUCAUUUUU GGAGGAGG
4461 UGCAGUCU CUGAUGA X GAA AGGUCCCU AGGGACCUC AGACUGCA
4477 CUGAGGAC CUGAUGA X GAA AGCUCCUU AAGGAGCUU GUCCUCAG
10 4480 GCCCUGAG CUGAUGA X GAA ACAAGCUC GAGCUUGUC CUCAGGGC
4483 AAUGCCCU CUGAUGA X GAA AGGACAAG CUUGUCCUC AGGGCAUU
4491 UCUCUGGA CUGAUGA X GAA AUGCCUG CAGGGCAUU UCCAGAGA
4492 UUCUCUGG CUGAUGA X GAA AAUGCCCU AGGGCAUUU CCAGAGAA
4493 CUUCUCUG CUGAUGA X GAA AAAUGCCC GGGCAUUUC CAGAGAAG
15 4525 GUAGAGUC CUGAUGA X GAA ACACAUUC GAAUGUGUU GACUCUAC
4530 AGAGAGUA CUGAUGA X GAA AGUCAACA UGUUGACUC UACUCUCU
4532 AAAGAGAG CUGAUGA X GAA AGAGUCAA UUGACUCUA CUCUCUUU
4535 GGAAAAGA CUGAUGA X GAA AGUAGAGU ACUCUACUC UCUUUUCC
4537 AUGGAAA CUGAUGA X GAA AGAGUAGA UCUACUCUC UUUUCCAU
20 4539 GAAUGGAA CUGAUGA X GAA AGAGAGUA UACUCUCUU UUCAUUC
4540 UGAAUGGA CUGAUGA X GAA AAGAGAGU ACUCUCUUU UCCAUUA
4541 AUGAAUGG CUGAUGA X GAA AAAGAGAG CUCUCUUUU CCAUUCAU
4542 AAUGAAUG CUGAUGA X GAA AAAAGAGA UCUCUUUUC CAUUCAUU
4546 UUUAAAUG CUGAUGA X GAA AUGGAAA UUUUCCAUU CAUUUAAA
25 4547 UUUUAAU CUGAUGA X GAA AAUGGAAA UUUCCAUUC AUUUAAAA
4550 GACUUUA CUGAUGA X GAA AUGAAUGG CCAUUCAUU UAAAAGUC
4551 GGACUUU CUGAUGA X GAA AAUGAAUG CAUUCAUUU AAAAGUCC
4552 AGGACUUU CUGAUGA X GAA AAAUGAAU AUUCAUUUA AAAGUCCU
4558 UUAUAUAG CUGAUGA X GAA ACUUUUA UUA AAAAGUC CUAUAUAA
30 4561 ACAUUAUA CUGAUGA X GAA AGGACUUU AAAGUCCUA UAUAAUGU

144

	4563	GCACAUUA	CUGAUGA	X	GAA	AUAGGACU	AGUCCUAUA	UAAUGUGC
	4565	GGGCACAU	CUGAUGA	X	GAA	AUAUAGGA	UCCUAUAUA	AUGUGCCC
	4583	GGUAGUGA	CUGAUGA	X	GAA	ACCACAGC	GCUGUGGUC	UCACUACC
	4585	CUGGUAGU	CUGAUGA	X	GAA	AGACCACA	UGUGGUCUC	ACUACCAG
5	4589	UUAACUGG	CUGAUGA	X	GAA	AGUGAGAC	GUCUCACUA	CCAGUUAA
	4595	UUUGCUUU	CUGAUGA	X	GAA	ACUGGUAG	CUACCAGUU	AAAGCAAA
	4596	UUUUGCUU	CUGAUGA	X	GAA	AACUGGUA	UACCAGUUA	AAGCAAAA
	4609	GUGUUUGA	CUGAUGA	X	GAA	AGUCUUUU	AAAAGACUU	UCAAACAC
	4610	CGUGUUUG	CUGAUGA	X	GAA	AAGUCUUU	AAAGACUUU	CAAACACG
10	4611	ACGUGUUU	CUGAUGA	X	GAA	AAAGUCUU	AAGACUUUC	AAACACGU
	4625	GGAGGACA	CUGAUGA	X	GAA	AGUCCACG	CGUGGACUC	UGUCCUCC
	4629	UCUUGGAG	CUGAUGA	X	GAA	ACAGAGUC	GACUCUGUC	CUCCAAGA
	4632	ACUUCUUG	CUGAUGA	X	GAA	AGGACAGA	UCUGUCCUC	CAAGAAGU
	4654	GUUUCACA	CUGAUGA	X	GAA	AGGUGCCG	CGGCACCUC	UGUGAAAC
15	4668	GCCCAUUC	CUGAUGA	X	GAA	AUCCAGUU	AACUGGAUC	GAAUGGGC
	4683	AACACACA	CUGAUGA	X	GAA	AGCAUUGC	GCAAUGCUU	UGUGUGUU
	4684	CAACACAC	CUGAUGA	X	GAA	AAGCAUUG	CAAUGCUUU	GUGUGUUG
	4691	CCAUCCUC	CUGAUGA	X	GAA	ACACACAA	UUGUGUGUU	GAGGAUGG
	4709	GGCCCUUG	CUGAUGA	X	GAA	ACAUCUCA	UGAGAUGUC	CCAGGGCC
20	4722	GGUAGACA	CUGAUGA	X	GAA	ACUCGGCC	GGCCGAGUC	UGUCUACC
	4726	CCAAGGUA	CUGAUGA	X	GAA	ACAGACUC	GAGUCUGUC	UACCUUGG
	4728	CUCCAAGG	CUGAUGA	X	GAA	AGACAGAC	GUCUGUCUA	CCUUGGAG
	4732	AAGCCUCC	CUGAUGA	X	GAA	AGGUAGAC	GUCUACCUU	GGAGGCUU
	4740	CCUCCACA	CUGAUGA	X	GAA	AGCCUCCA	UGGAGGCUU	UGUGGAGG
25	4741	UCCUCCAC	CUGAUGA	X	GAA	AAGCCUCC	GGAGGCUUU	GUGGAGGA
	4758	UUGGCUCA	CUGAUGA	X	GAA	AGCCCGCA	UGC GG GCUA	UGAGCCAA
	4771	CCACACUU	CUGAUGA	X	GAA	ACACUUGG	CCAAGUGUU	AAGUGUGG
	4772	CCCACACU	CUGAUGA	X	GAA	AACACUUG	CAAGUGUUA	AGUGUGGG
	4811	CUCCGAGC	CUGAUGA	X	GAA	ACUUGCGC	GCGCAAGUC	GCUCGGAG
30	4815	CGCUCUCC	CUGAUGA	X	GAA	AGCGACUU	AAGUCGCUC	GGAGAGCG

145

4826 CAGGCUCC CUGAUGA X GAA ACCGCUCU AGAGCGGUU GGAGCCUG
4844 GCCAGCAC CUGAUGA X GAA AUGCAUCU AGAUGCAUU GUGCUGGC
4854 CUCCACCA CUGAUGA X GAA AGCCAGCA UGCUGGCUC UGGUGGAG
4870 CAGGCCAC CUGAUGA X GAA AGCCCACC GGUGGGCUU GUGGCCUG
5 4880 CGUUUCCU CUGAUGA X GAA ACAGGCCA UGGCCUGUC AGGAAACG
4908 CAAAACCA CUGAUGA X GAA ACCCUGCC GGCAGGGUU UGGUUUUG
4909 CCAAAACC CUGAUGA X GAA AACCCUGC GCAGGGUUU GGUUUUGG
4913 CCUUCCAA CUGAUGA X GAA ACCAAACC GGUUUGGUU UUGGAAGG
4914 ACCUUCCA CUGAUGA X GAA AACCAAAC GUUUGGUUU UGGAAGGU
10 4915 AACCUUCC CUGAUGA X GAA AAACCAAA UUUGGUUUU GGAAGGUU
4923 AGCACGCA CUGAUGA X GAA ACCUUCCA UGGAAGGUU UGCGUGCU
4924 GAGCACGC CUGAUGA X GAA AACCUUCC GGAAGGUUU GCGUGCUC
4932 ACUGUGAA CUGAUGA X GAA AGCACGCA UGCGUGCUC UUCACAGU
4934 CGACUGUG CUGAUGA X GAA AGAGCACG CGUGCUCU CACAGUCG
15 4935 CCGACUGU CUGAUGA X GAA AAGAGCAC GUGCUCUUC ACAGUCGG
4941 UGUAACCC CUGAUGA X GAA ACUGUGAA UUCACAGUC GGGUUACA
4946 UCGCCUGU CUGAUGA X GAA ACCCGACU AGUCGGGUU ACAGGCGA
4947 CUCGCCUG CUGAUGA X GAA AACCCGAC GUCGGGUUA CAGGCGAG
4957 CCACAGGG CUGAUGA X GAA ACUCGCCU AGGCGAGUU CCCUGUGG
20 4958 GCCACAGG CUGAUGA X GAA AACUCGCC GGCAGAUUC CCUGUGGC
4969 GAGUAGGA CUGAUGA X GAA ACGCCACA UGUGGCGUU UCCUACUC
4970 GGAGUAGG CUGAUGA X GAA AACGCCAC GUGGCGUUU CCUACUCC
4971 AGGAGUAG CUGAUGA X GAA AAACGCCA UGGCGUUUC CUACUCCU
4974 AUUAGGAG CUGAUGA X GAA AGGAAACG CGUUUCCUA CUCCUAAU
25 4977 CUCAUUAG CUGAUGA X GAA AGUAGGAA UUCCUACUC CUAAUGAG
4980 ACUCUCAU CUGAUGA X GAA AGGAGUAG CUACUCCUA AUGAGAGU
4989 CCGGAAGG CUGAUGA X GAA ACUCUCAU AUGAGAGUU CCUCCGGG
4990 UCCGGAAG CUGAUGA X GAA AACUCUCA UGAGAGUUC CUUCCGGA
4993 GAGUCCGG CUGAUGA X GAA AGGAACUC GAGUCCUUC CCGGACUC
30 4994 AGAGUCCG CUGAUGA X GAA AAGGAACU AGUCCUUC CGGACUCU

5001 ACACGUAA CUGAUGA X GAA AGUCCGGA UCCGGACUC UUACGUGU
5003 AGACACGU CUGAUGA X GAA AGAGUCCG CGGACUCUU ACGUGUCU
5004 GAGACACG CUGAUGA X GAA AAGAGUCC GGACUCUUA CGUGUCUC
5010 GGCCAGGA CUGAUGA X GAA ACACGUAA UUACGUGUC UCCUGGCC
5 5012 CAGGCCAG CUGAUGA X GAA AGACACGU ACGUGUCUC CUGGCCUG
5046 GAAGGAGC CUGAUGA X GAA AGCUGCAU AUGCAGCUU GCUCCTUC
5050 UGAGGAAG CUGAUGA X GAA AGCAAGCU AGCUUGCUC CUUCCUCA
5053 AGAUGAGG CUGAUGA X GAA AGGAGCAA UUGCUCUU CCUCAUCU
5054 GAGAUGAG CUGAUGA X GAA AAGGAGCA UGCUCUUC CUCAUCUC
10 5057 UGAGAGAU CUGAUGA X GAA AGGAAGGA UCCUUCUC AUCUCUCA
5060 GCCUGAGA CUGAUGA X GAA AUGAGGAA UUCCUCAUC UCUCAGGC
5062 CAGCCUGA CUGAUGA X GAA AGAUGAGG CCUCAUCUC UCAGGCUG
5064 CACAGCCU CUGAUGA X GAA AGAGAUGA UCAUCUCUC AGGCUGUG
5076 UCUGAAUU CUGAUGA X GAA AGGCACAG CUGUGCCUU AAUUCAGA
15 5077 UUCUGAAU CUGAUGA X GAA AAGGCACA UGUGCCUUA AUUCAGAA
5080 GUGUUCUG CUGAUGA X GAA AUUAAGGC GCCUAAUU CAGAACAC
5081 GGUGUUCU CUGAUGA X GAA AAUUAAGG CCUAAUUC AGAACACC
5105 CCUCUGCC CUGAUGA X GAA ACGUCCU AGGAACGUC GGCAGAGG
5116 CCCGUCAG CUGAUGA X GAA AGCCUCUG CAGAGGCUC CUGACGGG
20 5135 GUUCUCAC CUGAUGA X GAA AUUCUUCG CGAAGAAU GUGAGAAC
5156 GAAACCCU CUGAUGA X GAA AGUUUCUG CAGAAACUC AGGGUUUC
5162 CCAGCAGA CUGAUGA X GAA ACCCUGAG CUCAGGGUU UCUGCUGG
5163 CCCAGCAG CUGAUGA X GAA AACCCUGA UCAGGGUUU CUGCUGGG
5164 ACCCAGCA CUGAUGA X GAA AAACCCUG CAGGGUUC UGCUGGGU
25 5203 AACCCUCA CUGAUGA X GAA ACCUGCCA UGGCAGGUC UGAGGGUU
5211 UGACAGAG CUGAUGA X GAA ACCCUCAG CUGAGGGUU CUCUGUCA
5212 UUGACAGA CUGAUGA X GAA AACCCUCA UGAGGGUUC UCUGUCA
5214 ACUUGACA CUGAUGA X GAA AGAACCCU AGGGUUCUC UGUCAAGU
5218 CGCCACUU CUGAUGA X GAA ACAGAGAA UUCUCUGUC AAGUGGCG
30 5229 UGAGCCUU CUGAUGA X GAA ACCGCCAC GUGGCGGUA AAGGCUCA

5236 ACCAGCCU CUGAUGA X GAA AGCCUUUA UAAAGGCUC AGGCUGGU
5247 AGAGGAAG CUGAUGA X GAA ACACCAGC GCUGGUGUU CUUCCUCU
5248 UAGAGGAA CUGAUGA X GAA AACACCAG CUGGUGUUC UUCCUCUA
5250 GAUAGAGG CUGAUGA X GAA AGAACACC GGUGUUCUU CCUCUAUC
5 5251 AGAUAGAG CUGAUGA X GAA AAGAACAC GUGUUCUUC CUCUAUCU
5254 UGGAGAUU CUGAUGA X GAA AGGAAGAA UUCUCCUC UAUCUCCA
5256 AGUGGAGA CUGAUGA X GAA AGAGGAAG CUUCCUCUA UCUCACU
5258 GGAGUGGA CUGAUGA X GAA AUAGAGGA UCCUCUAUC UCCACUCC
5260 CAGGAGUG CUGAUGA X GAA AGAUAGAG CUCUAUCUC CACUCCUG
10 5265 CCUGACAG CUGAUGA X GAA AGUGGAGA UCUCACUC CUGUCAGG
5270 GGGGGCCU CUGAUGA X GAA ACAGGAGU ACUCCUGUC AGGCCCCC
5283 AUACUGAG CUGAUGA X GAA ACUUGGGG CCCCAGUC CUCAGUAU
5286 AAAAUACU CUGAUGA X GAA AGGACUUG CAAGUCCUC AGUAUUUU
5290 AGCUAAAA CUGAUGA X GAA ACUGAGGA UCCUCAGUA UUUUAGCU
15 5292 AAAGCUAA CUGAUGA X GAA AUACUGAG CUCAGUAUU UUAGCUUU
5293 CAAAGCUA CUGAUGA X GAA AAUACUGA UCAGUAUUU UAGCUUUG
5294 ACAAAGCU CUGAUGA X GAA AAUACUG CAGUAUUUU AGCUUUGU
5295 CACAAAGC CUGAUGA X GAA AAAAUACU AGUAUUUUA GCUUUGUG
5299 AAGCCACA CUGAUGA X GAA AGCUAAAA UUUUAGCUU UGUGGCUU
20 5300 GAAGCCAC CUGAUGA X GAA AAGCUAAA UUUAGCUUU GUGGCUUC
5307 CCAUCAGG CUGAUGA X GAA AGCCACAA UUGUGGCUU CCUGAUGG
5308 GCCAUCAG CUGAUGA X GAA AAGCCACA UGUGGCUUC CUGAUGGC
5325 CCAAUUAA CUGAUGA X GAA AUUUUUCU AGAAAAUC UUAUUGG
5327 AACCAAUU CUGAUGA X GAA AGAUUUUU AAAAUUCUU AAUUGGUU
25 5328 CAACCAAU CUGAUGA X GAA AAGAUUUU AAAAUCUUA AUUGGUUG
5331 AACCAACC CUGAUGA X GAA AUUAAGAU AUCUUAUUU GGUUGGUU
5335 AGCAAACC CUGAUGA X GAA ACCAAUUA UAAUUGGUU GGUUUGCU
5339 GGAGAGCA CUGAUGA X GAA ACCAACCA UGGUUGGUU UGCUCUCC
5340 UGGAGAGC CUGAUGA X GAA AACCAACC GGUUGGUUU GCUCUCCA
30 5344 UAUCUGGA CUGAUGA X GAA AGCAAACC GGUUUGCUC UCCAGUAU

5346 AUUAUCUG CUGAUGA X GAA AGAGCAAA UUUGCUCUC CAGAUAAU
5352 CUAGUGAU CUGAUGA X GAA AUCUGGAG CUCCAGAU AUCACUAG
5355 UGGCUAGU CUGAUGA X GAA AUUAUCUG CAGAUAAUC ACUAGCCA
5359 AAUCUGGC CUGAUGA X GAA AGUGAUUA UAAUCACUA GCCAGAUU
5 5367 AAUUUCGA CUGAUGA X GAA AUCUGGCU AGCCAGAUU UCGAAAUU
5368 UAAUUUCG CUGAUGA X GAA AAUCUGGC GCCAGAUUU CGAAAUUA
5369 GUAAUUUC CUGAUGA X GAA AAAUCUGG CCAGAUUUC GAAAUUAC
5375 UAAAAAGU CUGAUGA X GAA AUUUCGAA UUCGAAAUU ACUUUUUA
5376 CUAAAAAG CUGAUGA X GAA AAUUUCGA UCGAAAUUA CUUUUUAG
10 5379 CGGCUAAA CUGAUGA X GAA AGUAAUUU AAAUUACUU UUUAGCCG
5380 UCGGCUAA CUGAUGA X GAA AAGUAAUU AAUUACUUU UUAGCCGA
5381 CUCGGCUA CUGAUGA X GAA AAAGUAAU AUUACUUUU UAGCCGAG
5382 CCUCGGCU CUGAUGA X GAA AAAAGUAA UUACUUUUU AGCCGAGG
5383 ACCUCGGC CUGAUGA X GAA AAAAGUA UACUUUUUA GCCGAGGU
15 5392 GUUAUCAU CUGAUGA X GAA ACCUCGGC GCCGAGGUU AUGAUAAAC
5393 UGUUAUCA CUGAUGA X GAA AACCUCGG CCGAGGUUA UGAUAACA
5398 GUAGAUGU CUGAUGA X GAA AUCAUAAC GUUAUGAU ACAUCUAC
5403 AUACAGUA CUGAUGA X GAA AUGUUAUC GAUAACAUC UACUGUAU
5405 GGAUACAG CUGAUGA X GAA AGAUGUUA UAACAUCUA CUGUAUCC
20 5410 CUAAAGGA CUGAUGA X GAA ACAGUAGA UCUACUGUA UCCUUUAG
5412 UUCUAAAG CUGAUGA X GAA AUACAGUA UACUGUAUC CUUUAGAA
5415 AAAUUCUA CUGAUGA X GAA AGGAUACA UGUAUCCUU UAGAAUUU
5416 AAAAUUCU CUGAUGA X GAA AAGGAUAC GUAUCCUUU AGAAUUUU
5417 UAAAAUUC CUGAUGA X GAA AAAGGAUA UAUCCUUUA GAAUUUUA
25 5422 UAGGUUAA CUGAUGA X GAA AUUCUAAA UUUAGAAUU UUAACCUA
5423 AUAGGUUA CUGAUGA X GAA AAUUCUAA UUAGAAUUU UAACCUAU
5424 UAUAGGUU CUGAUGA X GAA AAAUUCUA UAGAAUUUU AACCUAUA
5425 UUAUAGGU CUGAUGA X GAA AAAAUUCU AGAAUUUUA ACCUAUAA
5430 UAGUUUUA CUGAUGA X GAA AGGUUAAA UUUAAACCUA UAAAACUA
30 5432 CAUAGUUU CUGAUGA X GAA AUAGGUUA UAACCUAUA AAACUAUG

149

5438 AGUAGACA CUGAUGA X GAA AGUUUUUAU AUAAAACUA UGUCUACU
5442 AACCAGUA CUGAUGA X GAA ACAUAGUU AACUAUGUC UACUGGUU
5444 GAAACCAG CUGAUGA X GAA AGACAUAG CUAUGUCUA CUGGUUUC
5450 CAGGCAGA CUGAUGA X GAA ACCAGUAG CUACUGGUU UCUGCCUG
5 5451 ACAGGCAG CUGAUGA X GAA AACCAGUA UACUGGUUU CUGCCUGU
5452 CACAGGCA CUGAUGA X GAA AAACCAGU ACUGGUUUC UGCCUGUG

Where "X" represents stem II region of a HH ribozyme
(Hertel et al., 1992 *Nucleic Acids Res.* 20 3252). The
length of stem II may be ≥ 2 base-pairs.

150

Table VII: Mouse *flk-1* VEGF Receptor-Hairpin Ribozyme and Substrate Sequences

nt. Position		HP Ribozyme Sequence		Substrate	
5	74	GGGACACA	AGAA GGGCCC ACCAGAGAAAACACACGUGUGGUACAUAUACCUUGUA	GGGCCCCA	GAC UGUGUCCC
	88	GUUAUCCC	AGAA GCGGGA ACCAGAGAAAACACACGUGUGGUACAUAUACCUUGUA	UCCCCGCA	GCC GGGAUAAAC
	105	GGAAUCGG	AGAA GCCAGG ACCAGAGAAAACACACGUGUGGUACAUAUACCUUGUA	CCUGGCU	GAC CCGAUUCC
	110	UCCGCGGA	AGAA GGUCAG ACCAGAGAAAACACACGUGUGGUACAUAUACCUUGUA	CUGACCC	GAU UCCGCGGA
	125	CGGCUGUC	AGAA GUGUCC ACCAGAGAAAACACACGUGUGGUACAUAUACCUUGUA	GGACACC	GCU GACAGCCG
10	132	CCAGCCGC	AGAA GUCAGC ACCAGAGAAAACACACGUGUGGUACAUAUACCUUGUA	GCUGACA	GCC GCGGCUGG
	138	CUGGCUCC	AGAA GCGGCU ACCAGAGAAAACACACGUGUGGUACAUAUACCUUGUA	AGCCGCG	GCU GGAGCCAG
	175	CAGCGCAA	AGAA GGGGAG ACCAGAGAAAACACACGUGUGGUACAUAUACCUUGUA	CUCCCCG	GUC UUGCGCUG
	199	GUCACAGA	AGAA GUAUGG ACCAGAGAAAACACACGUGUGGUACAUAUACCUUGUA	CCAUACC	GCC UCUGUGAC
	309	CACAGAGC	AGAA GCUAGC ACCAGAGAAAACACACGUGUGGUACAUAUACCUUGUA	GCUAGCU	GUC GCUCUGUG
15	342	CCCACAGA	AGAA GCUCGG ACCAGAGAAAACACACGUGUGGUACAUAUACCUUGUA	CCGAGCC	GCC UCUGUGGG
	434	UGCAAGUA	AGAA GAAGGG ACCAGAGAAAACACACGUGUGGUACAUAUACCUUGUA	CCCUUCA	GAU UACUUGCA
	630	UAGACAU	AGAA GUGGAG ACCAGAGAAAACACACGUGUGGUACAUAUACCUUGUA	CUCCACU	GUU UAUGUCUA
	655	GAAUGGUG	AGAA GUAAUC ACCAGAGAAAACACACGUGUGGUACAUAUACCUUGUA	GAUUA	GAU CACCAUUC
	739	CGACCCUC	AGAA GGGGAU ACCAGAGAAAACACACGUGUGGUACAUAUACCUUGUA	AUCCCCU	GCC GAGGGUCC

151

807 CUGUUUCC AGAA GGAACA ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA UGUUCCG GAU GGAACACAG
920 ACAUGAUA AGAA GAUAGG ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA CCUAUCA GUC UAUCAUGU
1002 UUUUCC AGAA GAUAGC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA GCUAUCU GCC GGAGAAAA
1229 UCUUGAUC AGAA GUCCAC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA GUGGACG GAU GAUCAAGA
5 1365 AUAUCAGG AGAA GGUUA ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA UUAACCA GCU CCUGAUUAU
1556 UCUCACCG AGAA GGGUG ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA CACCCCA GAU CGGUGAGA
1629 UUGGCGUA AGAA GUGCAU ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA AUGACA GUC UACGCCAA
1687 UCUGUAGG AGAA GGUUC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA GAAGCCU GCU CCUACAGA
1696 UUGGCCG AGAA GUAGGA ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA UCCUACA GAC CCGGCCAA
10 1796 UUCUUUCA AGAA GGGCAU ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA AUGCCCU GAU UGAAGGAA
1950 GGCUGGGC AGAA GGUUGC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA GCAACCU GCU GCCCAGCC
1953 GUUGGCUG AGAA GCAGGU ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA ACCUGCU GCC CAGCCAAC
1985 CAGUGCAC AGAA GGGACA ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA UGUCCCU GUU GUGCACUG
2055 CCAUGUG AGAA GAUGU ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA AACUUG GUC CACAUGGG
15 2082 UUCUUGCA AGAA GGUGUG ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA CACACCA GUU UGCAAGAA
2208 UUAUCUUG AGAA GAGCAA ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA UUGUCU GCU CAAGAUAA
2252 GGAUGAUG AGAA GUUUGA ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA UCAACA GCU CAUCAUCC
2444 UGCGGAUA AGAA GGUUCC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA GGAACCU GAC UAUCCGCA
2639 GCUUAACG AGAA GUAGGA ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA UCCUACG GAC CGUUAAGC

151

152

2703	GGCAAUUC AGAA GGAUCC ACCAGAGAAAACACACGUGUGGUACAUAUACCCUGGUA	GGAUCCA GAU GAAUUGCC
2777	CUAGUUUUC AGAA GGUCCC ACCAGAGAAAACACACGUGUGGUACAUAUACCCUGGUA	GGGACCG GCU GAAACUAG
2832	CCAAAAGC AGAA GCCUCA ACCAGAGAAAACACACGUGUGGUACAUAUACCCUGGUA	UGAGGCA GAC GCUUUUGG
3199	AAAGCCUG AGAA GGCAGA ACCAGAGAAAACACACGUGUGGUACAUAUACCCUGGUA	UCUGCCA GCU CAGGCUUU
3278	GCUCCAAG AGAA GGAAGU ACCAGAGAAAACACACGUGUGGUACAUAUACCCUGGUA	ACUUCUU GAC CUUGGAGC
3304	CACUUGGA AGAA GUAACA ACCAGAGAAAACACACGUGUGGUACAUAUACCCUGGUA	UGUUACA GCU UCCAAAGUG
3421	CCGGGCCA AGAA GAAGUC ACCAGAGAAAACACACGUGUGGUACAUAUACCCUGGUA	GACUUCG GCU UGGCCCGG
3450	CUGACAUU AGAA GGGUCU ACCAGAGAAAACACACGUGUGGUACAUAUACCCUGGUA	AGACCCG GAU UAUGUCAG
3475	CAAAGGGA AGAA GGCAUC ACCAGAGAAAACACACGUGUGGUACAUAUACCCUGGUA	GAUGCCC GAC UCCCUUUG
3663	GUAGUGUA AGAA GGAGCC ACCAGAGAAAACACACGUGUGGUACAUAUACCCUGGUA	GGCUCCU GAC UACACUAC
3689	CCAGCAUG AGAA GGUACA ACCAGAGAAAACACACGUGUGGUACAUAUACCCUGGUA	UGUACCA GAC CAUGCUGG
3703	CUCAUGCC AGAA GUCCAG ACCAGAGAAAACACACGUGUGGUACAUAUACCCUGGUA	CUGGACU GCU GGCAUGAG
3860	GUGAGGUA AGAA GGGAGA ACCAGAGAAAACACACGUGUGGUACAUAUACCCUGGUA	UCUCCCU GCC UACCUCAC
3873	AUACAGGA AGAA GGUGAG ACCAGAGAAAACACACGUGUGGUACAUAUACCCUGGUA	CUCACCU GUT UCCUGUAU
4038	UGGCUGUC AGAA GGGAUC ACCAGAGAAAACACACGUGUGGUACAUAUACCCUGGUA	GAUCCCA GAU GACAGCCA
4181	AGCCACUG AGAA GGUUGG ACCAGAGAAAACACACGUGUGGUACAUAUACCCUGGUA	CCAACCA GAC CAGUGGCU
4196	GAUACCCA AGAA GGUAGC ACCAGAGAAAACACACGUGUGGUACAUAUACCCUGGUA	GCUACCA GUC UGGGUAUC
4212	UCUGUGUC AGAA GAGUGA ACCAGAGAAAACACACGUGUGGUACAUAUACCCUGGUA	UCACUCA GAU GACACAGA
4278	UCAGCGUG AGAA GCAGCA ACCAGAGAAAACACACGUGUGGUACAUAUACCCUGGUA	UGCUGCA GUT CAGGCUGA

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4287 GUCCCCUGA AGAA GCGUGA ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA UCACGCU GAC UCAGGGAC
4307 AGGAGGUG AGAA GCAGUG ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA CACUGCA GCU CACCUCCU
4318 UCCAUUUA AGAA GGAGGU ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA ACCUCCU GUU UAAAUGGA
4338 GGAGCCGG AGAA GGACCA ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA UGGUCCU GUC CCGGCUCC
5 4344 GGGGGCGG AGAA GGGACA ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA UGUCCCG GCU CCGCCCCC
4349 GAGUUGGG AGAA GAGCCG ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA CGGCUCC GCC CCCAACUC
4383 AAAAUUCUA AGAA GCACCU ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA AGGUGCU GCU UAGAUUUU
4462 UCCUUGCA AGAA GAGGUC ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA GACCUCA GAC UGCAAGGA
4574 GAGACCAC AGAA GGGCAC ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA GUGCCCU GCU GUGGUCUC
10 4626 UCUUGGAG AGAA GAGUCC ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA GGACUCU GUC CUCCAAGA
4723 CCAAGGUA AGAA GACUCG ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA CGAGUCU GUC UACCUUGG
4823 CAGGCUCC AGAA GCUCUC ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA GAGAGCG GUU GGAGCCUG
4836 CACAAUGC AGAA GCAGGC ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA GCCUGCA GAU GCAUUGUG
4896 ACCCUGCC AGAA GCCUUU ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA AAAGGCG GCC GGCAGGGU
15 4938 UGUAAACC AGAA GUGAAG ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA CUUCACA GUC GGGUUACA
4996 ACGUAAGA AGAA GGAAGG ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA CCUCCG GAC UCUIACGU
5042 AAGGAGCA AGAA GCAUCA ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA UGAUGCA GCU UGCUCUUU
5118 UCGGCCCC AGAA GGAGCC ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA GGCUCU GAC GGGGCCGA
5165 CUCCACCC AGAA GAAACC ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA GGUUCU GCU GGGUGGAG

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5310	UUUCUGCC AGAA GGAAGC ACCAGAGAAAACACACGUGUGUGGUACAUUACCUGGUA	GCUUCCU GAU GGCAGAAA
5363	AUUUCGAA AGAA GGCUAG ACCAGAGAAAACACACGUGUGUGGUACAUUACCUGGUA	CUAGCCA GAU UUCGAAAAU
5453	AGCACACA AGAA GAAACC ACCAGAGAAAACACACGUGUGUGGUACAUUACCUGGUA	GGUUUCU GCC UGUGUGCU

Table VIII: Mouse *flt-1* VEGF Receptor-Hammerhead Ribozyme and Substrate Sequence

	nt. Posi- tion	HH Ribozyme Sequence	Substrate
5	17	GUGAGCAA CUGAUGA X GAA ACGCGGCC	GGCCGCGUC UUGCUCAC
	19	UGGUGAGC CUGAUGA X GAA AGACGCGG	CCGCGUCUU GCUCACCA
	23	ACCAUGGU CUGAUGA X GAA AGCAAGAC	GUCUUGCUC ACCAUGGU
	32	CAGCAGCU CUGAUGA X GAA ACCAUGGU	ACCAUGGUC AGCUGCUG
10	53	UAAGGCAA CUGAUGA X GAA ACCGCGGU	ACCGCGGUC UUGCCUUA
	55	CGUAAGGC CUGAUGA X GAA AGACGCG	CGCGGUCUU GCTUUACG
	60	CAGCGCGU CUGAUGA X GAA AGGCAAGA	UCUUGCCUU ACGCGCUG
	61	GCAGCGCG CUGAUGA X GAA AAGGCAAG	CUUGCCUUA CGCGCUGC
	71	AGACACCC CUGAUGA X GAA AGCAGCGC	GCGCUGCUC GGGUGUCU
15	78	GAGAAGCA CUGAUGA X GAA ACACCCGA	UCGGGUGUC UGCUUCUC
	83	CCUGUGAG CUGAUGA X GAA AGCAGACA	UGUCUGCUU CUCACAGG
	84	UCCUGUGA CUGAUGA X GAA AAGCAGAC	GUCUGCUUC UCAACAGG
	86	UAUCCUGU CUGAUGA X GAA AGAAGCAG	CUGCUUCUC ACAGGAUA
	94	CUGAGCCA CUGAUGA X GAA AUCCUGUG	CACAGGAUA UGGCUCAG
20	100	UCGACCCU CUGAUGA X GAA AGCCAUAU	AUAUGGCUC AGGGUCGA
	106	UUAACUUC CUGAUGA X GAA ACCCUGAG	CUCAGGGUC GAAGUUAA
	112	GCACUUUU CUGAUGA X GAA ACUUCGAC	GUCGAAGUU AAAAGUGC
	113	GGCACUUU CUGAUGA X GAA AACUUCGA	UCGAAGUUA AAAGUGCC
	132	GCCUUUUA CUGAUGA X GAA ACUCAGUU	AACUGAGUU UAAAAGGC
25	133	UGCCUUUU CUGAUGA X GAA AACUCAGU	ACUGAGUUU AAAAGGCA
	134	GUGCCUUU CUGAUGA X GAA AAACUCAG	CUGAGUUUA AAAGGCAC
	152	GCUUGCAU CUGAUGA X GAA ACAUGCUG	CAGCAUGUC AUGCAAGC
	171	GAGAAAGA CUGAUGA X GAA AGUCUGGC	GCCAGACUC UCUUCUC
	173	UUGAGAAA CUGAUGA X GAA AGAGUCUG	CAGACUCUC UUCUCAAA
30	175	ACUUGAGA CUGAUGA X GAA AGAGAGUC	GACUCUCUU UCUCAAGU
	176	CACUUGAG CUGAUGA X GAA AAGAGAGU	ACUCUCUUU CUCAAGUG
	177	GCACUUGA CUGAUGA X GAA AAAGAGAG	CUCUCUUUC UCAAGUGC

156

179	CUGCACUU CUGAUGA X GAA AGAAAGAG	CUCUUUCUC AAGUGCAG
205	GAGACCAU CUGAUGA X GAA AGUGGGCU	AGCCACUC AUGGUCUC
211	UGGGCAGA CUGAUGA X GAA ACCAUGAG	CUCAUGGUC UCUGCCCA
213	CGUGGGCA CUGAUGA X GAA AGACCAUG	CAUGGUCUC UGCCCACG
5 254	GGGGGAGU CUGAUGA X GAA AUGCUCAG	CUGAGCAUC ACUCCCCC
258	CGAUGGGG CUGAUGA X GAA AGUGAUGC	GCAUCACUC CCCCAUCG
265	CACAGGCC CUGAUGA X GAA AUGGGGGA	UCCCCCAUC GGCCUGUG
282	UUGCCUGU CUGAUGA X GAA AUCCCUCC	GGAGGGAUA ACAGGCAA
292	UGCUGCAG CUGAUGA X GAA AUUGCCUG	CAGGCAAUU CUGCAGCA
10 293	GUGCUGCA CUGAUGA X GAA AAUUGCCU	AGGCAAUUC UGCAGCAC
304	CCAAGGUC CUGAUGA X GAA AGGUGCUG	CAGCACCUU GACCUUGG
310	CCGUGUCC CUGAUGA X GAA AGGUCAAG	CUUGACCUU GGACACGG
341	CAGGUGUA CUGAUGA X GAA AGGCCCGU	ACGGGCCUC UACACCTG
343	UACAGGUG CUGAUGA X GAA AGAGGCCC	GGGCCUCUA CACCUGUA
15 351	GAGGUAUC CUGAUGA X GAA ACAGGUGU	ACACCUGUA GAUACCUC
355	UAGGGAGG CUGAUGA X GAA AUCUACAG	CUGUAGAU CCUCCCUA
359	GAUGUAGG CUGAUGA X GAA AGGUAUCU	AGAUACCUC CCUACAUC
363	AGUAGAUG CUGAUGA X GAA AGGGAGGU	ACCUCCCUA CAUCUACU
367	UCGAAGUA CUGAUGA X GAA AUGUAGGG	CCCUACAUC UACUUCGA
20 369	CUUCGAAG CUGAUGA X GAA AGAUGUAG	CUACAUCUA CUUCGAAG
372	UUUCUUCG CUGAUGA X GAA AGUAGAUG	CAUCUACUU CGAAGAAA
373	UUUUCUUC CUGAUGA X GAA AAGUAGAU	AUCUACUUC GAAGAAAA
394	AGAUUGAA CUGAUGA X GAA AUUCCGCU	AGCGGAAUC UUCAAUCU
396	GUAGAUUG CUGAUGA X GAA AGAUUCCG	CGGAAUCUU CAAUCUAC
25 397	UGUAGAUU CUGAUGA X GAA AAGAUUCC	GGAAUCUUC AAUCUACA
401	AAUAUGUA CUGAUGA X GAA AUUGAAGA	UCUUCAAUC UACAUUUU
403	CAAUAUG CUGAUGA X GAA AGAUUGAA	UUCAAUCUA CAUAUUUG
407	CUAACAAA CUGAUGA X GAA AUGUAGAU	AUCUACAUA UUUGUUAG
409	CACUAACA CUGAUGA X GAA AUAUGUAG	CUACAUAUU UGUUAGUG
30 410	UCACUAAAC CUGAUGA X GAA AAUAUGUA	UACAUAUUU GUUAGUGA
413	GCAUCACU CUGAUGA X GAA ACAAUAU	AUAUUUGUU AGUGAUGC
414	UGCAUCAC CUGAUGA X GAA AACAAUA	UAUUUGUUA GUGAUGCA
429	UAUGAAAG CUGAUGA X GAA ACUCCUG	CAGGGAGUC CUUACAUA

432	CUCUAUGA CUGAUGA X GAA AGGACUCC	GGAGUCCUU UCAUAGAG	
433	UCUCUAUG CUGAUGA X GAA AAGGACUC	GAGUCCUUU CAUAGAGA	
434	AUCUCUAU CUGAUGA X GAA AAAGGACU	AGUCCUUUC AUAGAGAU	
437	UGCAUCUC CUGAUGA X GAA AUGAAAGG	CCUUUCAUA GAGAUGCA	
5	455	AGUUUGGG CUGAUGA X GAA AUGUCAGU	ACUGACAUA CCCAAACU
464	AUGUGCAC CUGAUGA X GAA AGUUUGGG	CCCAAACUU GUGCACAU	
491	GGGAUGAU CUGAUGA X GAA AGCUGUCU	AGACAGCUC AUCAUCCC	
494	CAGGGGAU CUGAUGA X GAA AUGAGCUG	CAGCUCAUC AUCCCCUG	
497	CGGCAGGG CUGAUGA X GAA AUGAUGAG	CUCAUCAUC CCCUGCCG	
10	514	CGUUUGGU CUGAUGA X GAA ACGUCACC	GGUGACGUC ACCCAACG
524	GUGACUGU CUGAUGA X GAA ACGUUGGG	CCCAACGUC ACAGUCAC	
530	UUUAGGGU CUGAUGA X GAA ACUGUGAC	GUCACAGUC ACCCUAAA	
536	AACUUUUU CUGAUGA X GAA AGGGUGAC	GUCACCCUA AAAAAGUU	
544	CAAAUGGA CUGAUGA X GAA ACUUUUUU	AAAAAGUU UCCAUUUG	
15	545	UCAAUUGG CUGAUGA X GAA AACUUUUU	AAAAAGUUU CCAUUUGA
546	AUCAAUUG CUGAUGA X GAA AAACUUUU	AAAAGUUUC CAUUUGAU	
550	GAGUAUCA CUGAUGA X GAA AUGGAAAC	GUUCCAUU UGAUACUC	
551	AGAGUAUC CUGAUGA X GAA AAUGGAAA	UUUCCAUUU GAUACUCU	
555	GGUAAGAG CUGAUGA X GAA AUCAAUUG	CAUUUGAUA CUCUUACC	
20	558	AGGGGUAA CUGAUGA X GAA AGUAUCAA	UUGAUACUC UUACCCCU
560	UCAGGGGU CUGAUGA X GAA AGAGUAUC	GAUACUCUU ACCCCUGA	
561	AUCAGGGG CUGAUGA X GAA AAGAGUAU	AUACUCUUA CCCUGAU	
581	UCCCAUGU CUGAUGA X GAA AUUCUUUG	CAAAGAAUA ACAUGGGA	
594	GCCUCUCC CUGAUGA X GAA ACUGUCCC	GGGACAGUA GGAGAGGC	
25	604	CUAUUAUA CUGAUGA X GAA AGCCUCUC	GAGAGGCUU UAUAAUAG
605	GCUAUUAU CUGAUGA X GAA AAGCCUCU	AGAGGCUUU AUAAUAGC	
606	UGCUAUUA CUGAUGA X GAA AAAGCCUC	GAGGCUUUA UAAUAGCA	
608	UUUGCUAU CUGAUGA X GAA AUAAAGCC	GGCUUUAUA AUAGCAAA	
611	GCAUUUGC CUGAUGA X GAA AUUAUAAA	UUUAUAAUA GCAAAUGC	
30	625	UCUCUUUG CUGAUGA X GAA ACGUUGCA	UGCAACGUA CAAAGAGA
635	AGCAGUCC CUGAUGA X GAA AUCUCUUU	AAAGAGUA GGACUGCU	
662	UGCCCGUU CUGAUGA X GAA ACGGUGGC	GCCACCGUC AACGGGCA	
676	UUGUCUGG CUGAUGA X GAA ACAGGUGC	GCACCUGUA CCAGACAA	

688	GGGUCAGA CUGAUGA X GAA AGUUUGUC	GACAAACUA UCUGACCC
690	AUGGGUCA CUGAUGA X GAA AUAGUUUG	CAAACUAUC UGACCCAU
699	GGUCUGCC CUGAUGA X GAA AUGGGUCA	UGACCCAU C GGCAGACC
711	UAGGAUUG CUGAUGA X GAA AUUGGUCU	AGACCAAUA CAAUCCUA
5 716	ACAUCUAG CUGAUGA X GAA AUUGUAUU	AAUACAAUC CUAGAUGU
719	UGGACAUC CUGAUGA X GAA AGGAUUGU	ACAAUCCUA GAUGUCCA
725	CGUAUUUG CUGAUGA X GAA ACAUCUAG	CUAGAUGUC CAAAUACG
731	GGCGGGCG CUGAUGA X GAA AUUUGGAC	GUCCAAUA CGCCCCGC
758	UGCCCGUG CUGAUGA X GAA AGCAGUCU	AGACUGCUC CACGGGCA
10 771	GAGGACAA CUGAUGA X GAA AGUCUGCC	GGCAGACUC UUGUCCUC
773	UUGAGGAC CUGAUGA X GAA AGAGUCUG	CAGACUCUU GUCCUCAA
776	CAGUUGAG CUGAUGA X GAA ACAAGAGU	ACUCUUGUC CUCAACUG
779	GUGCAGUU CUGAUGA X GAA AGGACAAG	CUUGUCCUC AACUGCAC
803	CUCGUUUU CUGAUGA X GAA AGCUCCGU	ACGGAGCUC AAUACGAG
15 807	CACCCUCG CUGAUGA X GAA AUUGAGCU	AGCUCAAUA CGAGGGUG
831	ACCAGGGU CUGAUGA X GAA AUUCCAGC	GCUGGAAUU ACCCUGGU
832	UACCAGGG CUGAUGA X GAA AAUCCAG	CUGGAAUUA CCCUGGUA
840	AGUUGCUU CUGAUGA X GAA ACCAGGGU	ACCCUGGUA AAGCAACU
849	UGCUCUCU CUGAUGA X GAA AGUUGCUU	AAGCAACUA AGAGAGCA
20 859	GCCUUUAU CUGAUGA X GAA AUGCUCUC	GAGAGCAUC UAUAAAGGC
861	CUGCCUUA CUGAUGA X GAA AGAUGCUC	GAGCAUCUA UAAGGCAG
863	CGCUGCCU CUGAUGA X GAA AUAGAUGC	GCAUCUUA AGGCAGCG
875	CUCCGGUC CUGAUGA X GAA AUCCGCUG	CAGCGGAUU GACCCGAG
888	GUUGUGGG CUGAUGA X GAA AUGGCUCC	GGAGCCAUU CCCACAAC
25 889	UGUUGUGG CUGAUGA X GAA AAUGGCUC	GAGCCAUUC CCACAACA
904	CACUGUGG CUGAUGA X GAA ACACAUUG	CAAUGUGUU CCACAGUG
905	ACACUGUG CUGAUGA X GAA AACACAUU	AAUGUGUUC CACAGUGU
914	AUCUUAAG CUGAUGA X GAA ACACUGUG	CACAGUGUU CUUAAGAU
915	GAUCUUA CUGAUGA X GAA AACACUGU	ACAGUGUUC UUAAGAUC
30 917	UUGAUCUU CUGAUGA X GAA AGAACACU	AGUGUUCUU AAGAUCAA
918	GUUGAUCU CUGAUGA X GAA AAGAACAC	GUGUUCUUA AGAUCAAC
923	ACAUUGUU CUGAUGA X GAA AUCUUAAG	CUUAAGAUC AACAAUGU
953	CAGGUGUA CUGAUGA X GAA AGCCCCUU	AAGGGGCUC UACACCTUG

159

955	GACAGGUG	CUGAUGA	X	GAA	AGAGCCCC	GGGGCUCUA	CACCUGUC	
963	CUUCACGC	CUGAUGA	X	GAA	ACAGGUGU	ACACCUGUC	GCGUGAAG	
979	GGAACGAG	CUGAUGA	X	GAA	ACCCACUC	GAGUGGGUC	CUCGUUCC	
982	ACUGGAAC	CUGAUGA	X	GAA	AGGACCCA	UGGGUCCUC	GUUCCAGU	
5	985	AAGACUGG	CUGAUGA	X	GAA	ACGAGGAC	GUCCUCGUU	CCAGUCUU
986	AAAGACUG	CUGAUGA	X	GAA	AACGAGGA	UCCUCGUUC	CAGUCUUU	
991	UGUUGAAA	CUGAUGA	X	GAA	ACUGGAAC	GUUCCAGUC	UUUCAACA	
993	GGUGUUGA	CUGAUGA	X	GAA	AGACUGGA	UCCAGUCUU	UCAACACC	
994	AGGUGUUG	CUGAUGA	X	GAA	AAGACUGG	CCAGUCUUU	CAACACCU	
10	995	GAGGUGUU	CUGAUGA	X	GAA	AAAGACUG	CAGUCUUUC	AACACCUC
1003	CAUGCACG	CUGAUGA	X	GAA	AGGUGUUG	CAACACCUC	CGUGCAUG	
1015	CUUUUUCA	CUGAUGA	X	GAA	ACACAUGC	GCAUGUGUA	UGAAAAAG	
1027	CACUGAUG	CUGAUGA	X	GAA	AUCCUUUU	AAAAGGAUU	CAUCAGUG	
1028	ACACUGAU	CUGAUGA	X	GAA	AAUCCUUU	AAAGGAUUC	AUCAGUGU	
15	1031	UUCACACU	CUGAUGA	X	GAA	AUGAAUCC	GGAUUCAUC	AGUGUGAA
1044	CUGCUUCC	CUGAUGA	X	GAA	AUGUUUCA	UGAAACAUC	GGAAGCAG	
1084	GCCGAUAG	CUGAUGA	X	GAA	ACCGUCUU	AAGACGGUC	CUAUCGGC	
1087	ACAGCCGA	CUGAUGA	X	GAA	AGGACCGU	ACGGUCCUA	UCGGCUGU	
1089	GGACAGCC	CUGAUGA	X	GAA	AUAGGACC	GGUCCUAUC	GGCUGUCC	
20	1096	CUUUCAUG	CUGAUGA	X	GAA	ACAGCCGA	UCGGCUGUC	CAUGAAAG
1114	GGGAGGGG	CUGAUGA	X	GAA	AGGCCUUC	GAAGGCCUU	CCCCUCCC	
1115	GGGGAGGG	CUGAUGA	X	GAA	AAGGCCUU	AAGGCCUUC	CCCUCCCC	
1120	UUUCUGGG	CUGAUGA	X	GAA	AGGGGAAG	CUUCCCCUC	CCCAGAAA	
1130	AACCAUAC	CUGAUGA	X	GAA	AUUUCUGG	CCAGAAAUC	GUAUGGUU	
25	1133	UUUAACCA	CUGAUGA	X	GAA	ACGAUUUC	GAAAUUCUA	UGGUUAAA
1138	CAUCUUUU	CUGAUGA	X	GAA	ACCAUACG	CGUAUGGUU	AAAAGAUG	
1139	CCAUCUUU	CUGAUGA	X	GAA	AACCAUAC	GUAUGGUUA	AAAGAUGG	
1150	UUGCAGGC	CUGAUGA	X	GAA	AGCCAUCU	AGAUGGCUC	GCCUGCAA	
1162	CAGACUUC	CUGAUGA	X	GAA	AUGUUGCA	UGCAACAUU	GAAGUCUG	
30	1168	AGCGAGCA	CUGAUGA	X	GAA	ACUUCAAU	AUUGAAGUC	UGCUCGCU
1173	CAAAUAGC	CUGAUGA	X	GAA	AGCAGACU	AGUCUGCUC	GCUAUUUG	
1177	GUACCAA	CUGAUGA	X	GAA	AGCGAGCA	UGCUCGCUA	UUUGGUAC	
1179	AUGUACCA	CUGAUGA	X	GAA	AUAGCGAG	CUCGCUAUU	UGGUACAU	

1180	CAUGUACC CUGAUGA X GAA AAUAGCGA	UCGCUAUUU GGUACAUG
1184	UAGCCAUG CUGAUGA X GAA ACCAAAUA	UAUUUGGUA CAUGGCUA
1192	UUA AUGAG CUGAUGA X GAA AGCCAUGU	ACAUGGCUA CUCAUUA
1195	UAAUAAU CUGAUGA X GAA AGUAGCCA	UGGCUACUC AUUAAUUA
5 1198	UGAUAAU CUGAUGA X GAA AUGAGUAG	CUACUCAUU AAUUAUCA
1199	UUGAUAAU CUGAUGA X GAA AAUGAGUA	UACUCAUUA AUUAUCAA
1202	UCUUUGAU CUGAUGA X GAA AUUAAUGA	UCAUUAUU AUCAAAGA
1203	AUCUUUGA CUGAUGA X GAA AAUUA AUG	CAUUAUUA UCAAAGAU
1205	ACAUCUUU CUGAUGA X GAA AUAAUUA	UUAAUUAUC AAAGAUGU
10 1237	AGAUCGUA CUGAUGA X GAA AGUCCCCU	AGGGGACUA UACGAUCTU
1239	CAAGAU CG CUGAUGA X GAA AUAGUCCC	GGGACUUA CGAUCUUG
1244	CCCAGCAA CUGAUGA X GAA AUCGUUA	UAUACGAUC UUGCUGGG
1246	UGCCCAGC CUGAUGA X GAA AGAUCGUA	UACGAUCUU GCUGGGCA
1256	GACUGCUU CUGAUGA X GAA AUGCCCAG	CUGGGCAUA AAGCAGUC
15 1264	AUAGCCUU CUGAUGA X GAA ACUGCUUU	AAAGCAGUC AAGGCUAU
1271	UUUUUAAA CUGAUGA X GAA AGCCUUGA	UCAAGGCUA UUUAAAAA
1273	GGUUUUUA CUGAUGA X GAA AUAGCCUU	AAGGCUAUU UAAAAACC
1274	AGGUUUUU CUGAUGA X GAA AAUAGCCU	AGGCUAUUU AAAAACCUC
1275	GAGGUUUU CUGAUGA X GAA AAUAGCC	GGCUAUUUA AAAACCUC
20 1283	GUGGCAGU CUGAUGA X GAA AGGUUUUU	AAAAACCUC ACUGCCAC
1293	UACAAUGA CUGAUGA X GAA AGUGGCAG	CUGCCACUC UCAUUGUA
1295	UUUACAAU CUGAUGA X GAA AGAGUGGC	GCCACUCUC AUUGUAAA
1298	ACGUUUAC CUGAUGA X GAA AUGAGAGU	ACUCUCAUU GUAAACGU
1301	UUCACGUU CUGAUGA X GAA ACAUGAG	CUCAUUGUA AACGUGAA
25 1314	GUAGAUCU CUGAUGA X GAA AGGUUUCA	UGAAACCUC AGAUCUAC
1319	UUUUCGUA CUGAUGA X GAA AUCUGAGG	CCUCAGAUC UACGAAAA
1321	ACUUUUCG CUGAUGA X GAA AGAUCUGA	UCAGAUCUA CGAAAAGU
1330	AGGACACG CUGAUGA X GAA ACUUUUCG	CGAAAAGUC CGUGUCCU
1336	GAAGCGAG CUGAUGA X GAA ACACGGAC	GUCCGUGUC CUCGCUUC
30 1339	UUGGAAGC CUGAUGA X GAA AGGACACG	CGUGUCCUC GCUUCCAA
1343	GGGCUUGG CUGAUGA X GAA AGCGAGGA	UCCUCGCUU CCAAGCCC
1344	UGGGCUUG CUGAUGA X GAA AAGCGAGG	CCUCGCUUC CAAGCCCA
1356	CGGAUAGA CUGAUGA X GAA AGGUGGGC	GGCCACCUC UCUAUCCG

161

1358	AGCGGAUA CUGAUGA X GAA AGAGGUGG	CCACCUCUC UAUCCGCU
1360	CCAGCGGA CUGAUGA X GAA AGAGAGGU	ACCUCUCUA UCCGCUUG
1362	GCCCAGCG CUGAUGA X GAA AUAGAGAG	CUCUCUAUC CGCUGGGC
1382	CAAGUGAG CUGAUGA X GAA ACUUGUCU	AGACAAGUC CUCACUUG
5 1385	GUGCAAGU CUGAUGA X GAA AGGACUUG	CAAGUCCUC ACUUGCAC
1389	CACGGUGC CUGAUGA X GAA AGUGAGGA	UCCUCACUU GCACCGUG
1399	GGAUGCCA CUGAUGA X GAA ACACGGUG	CACCGUGUA UGGCAUCC
1406	GGCCGAGG CUGAUGA X GAA AUGCCAU	UAUGGCAUC CCUCGGCC
1410	UGUUGGCC CUGAUGA X GAA AGGGAUGC	GCAUCCUC GGCCAACA
10 1421	AGCCACGU CUGAUGA X GAA AUUGUUGG	CCAACAAUC ACGUGGCU
1430	GGGUGCCA CUGAUGA X GAA AGCCACGU	ACGUGGCUC UGGCACCC
1443	AUUGUGGU CUGAUGA X GAA ACAGGGGU	ACCCUGUC ACCACAAU
1452	UUUGGAGU CUGAUGA X GAA AUUGUGGU	ACCACAAUC ACUCCAAA
1456	UUUCUUUG CUGAUGA X GAA AGUGAUUG	CAAUCACUC CAAAGAAA
15 1468	AGAAGUCA CUGAUGA X GAA ACCUUUCU	AGAAAGGUA UGACUUCU
1474	CAGUGCAG CUGAUGA X GAA AGUCAUAC	GUAUGACUU CUGCACUG
1475	UCAGUGCA CUGAUGA X GAA AAGUCAUA	UAUGACUUC UGCACUGA
1495	GGAUAAAG CUGAUGA X GAA AUUCUUCA	UGAAGAAUC CUUUAUCC
1498	CCAGGAUA CUGAUGA X GAA AGGAUUCU	AGAAUCCUU UAUCCUGG
20 1499	UCCAGGAU CUGAUGA X GAA AAGGAUUC	GAAUCCUUU AUCCUGGA
1500	AUCCAGGA CUGAUGA X GAA AAAGGAUU	AAUCCUUUA UCCUGGAU
1502	GGAUCCAG CUGAUGA X GAA AUAAAGGA	UCCUUUAUC CUGGAUCC
1509	GCUGCUGG CUGAUGA X GAA AUCCAGGA	UCCUGGAUC CCAGCAGC
1522	UGUUUCCU CUGAUGA X GAA AGUUGCUG	CAGCAACUU AGGAAACA
25 1523	CUGUUUCC CUGAUGA X GAA AAGUUGCU	AGCAACUUA GGAAACAG
1535	AUGCUCUC CUGAUGA X GAA AUUCUGUU	AACAGAAUU GAGAGCAU
1544	CGCUGAGA CUGAUGA X GAA AUGCUCUC	GAGAGCAUC UCUCAGCG
1546	UGCUCUGA CUGAUGA X GAA AGAUGCUC	GAGCAUCUC UCAGCGCA
1548	CAUGCUCU CUGAUGA X GAA AGAGAUGC	GCAUCUCUC AGCGCAUG
30 1562	CCUUCUUAU CUGAUGA X GAA ACCGUCAU	AUGACGGUC AUAGAAGG
1565	GUUCCUUC CUGAUGA X GAA AUGACCGU	ACGGUCAUA GAAGGAAC
1578	AACCGUCU CUGAUGA X GAA AUUUGUUC	GAACAAAUA AGACGGUU
1586	AAUGUGCU CUGAUGA X GAA ACCGUCUU	AAGACGGUU AGCACAUU

162

1587	CAAUGUGC	CUGAUGA	X	GAA	AACCGUCU	AGACGGUUA	GCACAUUG	
1594	CCACCACC	CUGAUGA	X	GAA	AUGUGCUA	UAGCACAUU	GGUGGUGG	
1609	GGGUCUGA	CUGAUGA	X	GAA	AGUCAGCC	GGCUGACUC	UCAGACCC	
1611	AGGGGUCU	CUGAUGA	X	GAA	AGAGUCAG	CUGACUCUC	AGACCCCU	
5	1625	CAGCUGUA	CUGAUGA	X	GAA	AUUC CAGG	CCUGGAAUC	UACAGCUG
	1627	GGCAGCUG	CUGAUGA	X	GAA	AGAUUCCA	UGGAAUCUA	CAGCUGCC
	1642	UUUUUAUUG	CUGAUGA	X	GAA	AGGCCCGG	CCGGGCCUU	CAAUAAAA
	1643	AUUUUUAU	CUGAUGA	X	GAA	AAGGCCCG	CGGGCCUUC	AAUAAAAU
	1647	CCCUAUUU	CUGAUGA	X	GAA	AUUGAAGG	CCUUCAAUA	AAAUAGGG
10	1652	ACAGUCCC	CUGAUGA	X	GAA	AUUUUUAU	AAUAAAAUA	GGGACUGU
	1673	UAAAAUUU	CUGAUGA	X	GAA	AUGUUUCU	AGAAACAUU	AAAUUUUA
	1678	UGACAUAA	CUGAUGA	X	GAA	AUUUUAUG	CAUAAAAUU	UUAUGUCA
	1679	GUGACAUU	CUGAUGA	X	GAA	AAUUUUUA	AUAAAAUUU	UAUGUCAC
	1680	UGUGACAU	CUGAUGA	X	GAA	AAAUUUUA	UAAAAUUUU	AUGUCACA
15	1681	CUGUGACA	CUGAUGA	X	GAA	AAAAUUUU	AAAAUUUUA	UGUCACAG
	1685	ACAUCUGU	CUGAUGA	X	GAA	ACAUAAAA	UUUUAUGUC	ACAGAUGU
	1705	AAACGUGA	CUGAUGA	X	GAA	AGCCAUUC	GAAUGGCUU	UCACGUUU
	1706	GAAACGUG	CUGAUGA	X	GAA	AAGCCAUU	AAUGGCUUU	CACGUUUC
	1707	GGAAACGU	CUGAUGA	X	GAA	AAAGCCAU	AUGGCUUUC	ACGUUUCC
20	1712	UCCAAGGA	CUGAUGA	X	GAA	ACGUGAAA	UUUCACGUU	UCCUUGGA
	1713	UUCCAAGG	CUGAUGA	X	GAA	AACGUGAA	UUCACGUUU	CCUUGGAA
	1714	UUUCCAAG	CUGAUGA	X	GAA	AAACGUGA	UCACGUUUC	CUUGGAAA
	1717	UCUUUUC	CUGAUGA	X	GAA	AGGAAACG	CGUUUCCUU	GGAAAAGA
	1756	CCACACAG	CUGAUGA	X	GAA	ACAGUUUC	GAAACUGUC	CUGUGUGG
25	1766	AAUUUAU	CUGAUGA	X	GAA	ACCACACA	UGUGUGGUC	AAUAAAUU
	1770	CAGGAAUU	CUGAUGA	X	GAA	AUUGACCA	UGGUCAAUA	AAUUC CUG
	1774	UGUACAGG	CUGAUGA	X	GAA	AUUUAUUG	CAAUAAAUU	CCUGUACA
	1775	CUGUACAG	CUGAUGA	X	GAA	AAUUUAU	AAUAAAUUC	CUGUACAG
	1780	UGUCUCUG	CUGAUGA	X	GAA	ACAGGAAU	AUUC CUGUA	CAGAGACA
30	1790	AUCCAGGU	CUGAUGA	X	GAA	AUGUCUCU	AGAGACAUU	ACCUGGAU
	1791	AAUCCAGG	CUGAUGA	X	GAA	AAUGUCUC	GAGACAUUA	CCUGGAUU
	1799	CGUAGCAG	CUGAUGA	X	GAA	AUCCAGGU	ACCUGGAUU	CUGCUACG
	1800	CCGUAGCA	CUGAUGA	X	GAA	AAUCCAGG	CCUGGAUUC	UGCUACGG

	1805	ACUGUCCG	CUGAUGA	X	GAA	AGCAGAAU	AUUCUGCUA	CGGACAGU
	1814	CUGUUGUU	CUGAUGA	X	GAA	ACUGUCCG	CGGACAGUU	AACAACAG
	1815	UCUGUUGU	CUGAUGA	X	GAA	AACUGUCC	GGACAGUUA	ACAACAGA
	1836	GCUGAUAC	CUGAUGA	X	GAA	AUGGUGCA	UGCACCAUA	GUAUCAGC
5	1839	CUUGCUGA	CUGAUGA	X	GAA	ACUAUGGU	ACCAUAGUA	UCAGCAAG
	1841	UGCUUGCU	CUGAUGA	X	GAA	AUACUAUG	CAUAGUAUC	AGCAAGCA
	1866	GUAAUCUU	CUGAUGA	X	GAA	AGUGGUGG	CCACCACUC	AAGAUUAC
	1872	GAUGGAGU	CUGAUGA	X	GAA	AUCUUGAG	CUCAAGAUU	ACUCCAUC
	1873	UGAUGGAG	CUGAUGA	X	GAA	AAUCUUGA	UCAAGAUUA	CUCCAUCA
10	1876	GAGUGAUG	CUGAUGA	X	GAA	AGUAAUCU	AGAUUACUC	CAUCACUC
	1880	UUCAGAGU	CUGAUGA	X	GAA	AUGGAGUA	UACUCCAUC	ACUCUGAA
	1884	AAGGUUCA	CUGAUGA	X	GAA	AGUGAUGG	CCAUCACUC	UGAACCUU
	1892	UUGAUGAC	CUGAUGA	X	GAA	AGGUUCAG	CUGAACCTU	GUCAUCAA
	1895	UUCUUGAU	CUGAUGA	X	GAA	ACAAGGUU	AACCUUGUC	AUCAAGAA
15	1898	ACGUUCUU	CUGAUGA	X	GAA	AUGACAAG	CUUGUCAUC	AAGAACGU
	1909	CUUCUAGA	CUGAUGA	X	GAA	ACACGUUC	GAACGUGUC	UCUAGAAG
	1911	GUCUUCUA	CUGAUGA	X	GAA	AGACACGU	ACGUGUCUC	UAGAAGAC
	1913	GAGUCUUC	CUGAUGA	X	GAA	AGAGACAC	GUGUCUCUA	GAAGACUC
	1921	AGGUGCCC	CUGAUGA	X	GAA	AGUCUUCU	AGAAGACUC	GGGCACCU
20	1930	UGCACGCA	CUGAUGA	X	GAA	AGGUGCCC	GGGCACCUA	UGCGUGCA
	1952	CCUGUGUA	CUGAUGA	X	GAA	AUGUCCU	AGGAACAU	UACACAGG
	1954	CCCCUGUG	CUGAUGA	X	GAA	AUAUGUUC	GAACAUUA	CACAGGGG
	1970	UUCCGAAG	CUGAUGA	X	GAA	AUGUCUUC	GAAGACAUC	CUUCGGAA
	1973	GUCUUCCG	CUGAUGA	X	GAA	AGGAUGUC	GACAUCCU	CGGAAGAC
25	1974	UGUCUUC	CUGAUGA	X	GAA	AAGGAUGU	ACAUCCUUC	GGAAGACA
	1988	CUAACGAG	CUGAUGA	X	GAA	ACUUCUGU	ACAGAAGUU	CUCGUUAG
	1989	UCUAACGA	CUGAUGA	X	GAA	AACUUCUG	CAGAAGUUC	UCGUUAGA
	1991	UCUCUAA	CUGAUGA	X	GAA	AGAACUUC	GAAGUUCUC	GUUAGAGA
	1994	GAAUCUCU	CUGAUGA	X	GAA	ACGAGAAC	GUUCUCGUU	AGAGAUUC
30	1995	CGAAUCUC	CUGAUGA	X	GAA	AACGAGAA	UUCUCGUUA	GAGAUUCG
	2001	CGCUUCCG	CUGAUGA	X	GAA	AUCUCUAA	UUAGAGAUU	CGGAAGCG
	2002	GCGCUUCC	CUGAUGA	X	GAA	AAUCUCUA	UAGAGAUUC	GGAAGCGC
	2021	AGGUUUUG	CUGAUGA	X	GAA	AGCAGGUG	CACCUGCUU	CAAAACCU

164

	2022	GAGGUUUU	CUGAUGA	X	GAA	AAGCAGGU	ACCUGCUUC	AAAACCUC
	2030	UAGUCACU	CUGAUGA	X	GAA	AGGUUUUG	CAAAACCUC	AGUGACUA
	2038	AGACCUCG	CUGAUGA	X	GAA	AGUCACUG	CAGUGACUA	CGAGGUCU
	2045	CUGAUGGA	CUGAUGA	X	GAA	ACCUCGUA	UACGAGGUC	UCCAUCAG
5	2047	CACUGAUG	CUGAUGA	X	GAA	AGACCUCG	CGAGGUCUC	CAUCAGUG
	2051	GAGCCACU	CUGAUGA	X	GAA	AUGGAGAC	GUCUCCAUC	AGUGGCUC
	2059	AGGUCGUA	CUGAUGA	X	GAA	AGCCACUG	CAGUGGCUC	UACGACCU
	2061	UAAGGUCG	CUGAUGA	X	GAA	AGAGCCAC	GUGGCUCUA	CGACCUUA
	2068	GACAGUCU	CUGAUGA	X	GAA	AGGUCGUA	UACGACCUU	AGACUGUC
10	2069	UGACAGUC	CUGAUGA	X	GAA	AAGGUCGU	ACGACCUUA	GACUGUCA
	2076	UCUAGCUU	CUGAUGA	X	GAA	ACAGUCUA	UAGACUGUC	AAGCUAGA
	2082	GACACCUC	CUGAUGA	X	GAA	AGCUUGAC	GUCAAGCUA	GAGGUGUC
	2090	GGCGCGGG	CUGAUGA	X	GAA	ACACCUCU	AGAGGUGUC	CCCGCGCC
	2100	AGUGAUCU	CUGAUGA	X	GAA	AGGCGCGG	CCGCGCCUC	AGAUACAU
15	2105	AACCAAGU	CUGAUGA	X	GAA	AUCUGAGG	CCUCAGAUC	ACUUGGUU
	2109	UUUGAACC	CUGAUGA	X	GAA	AGUGAUCU	AGAUCACUU	GGUUCAAA
	2113	UGUUUUUG	CUGAUGA	X	GAA	ACCAAGUG	CACUUGGUU	CAAAAACA
	2114	UUGUUUUU	CUGAUGA	X	GAA	AACCAAGU	ACUUGGUUC	AAAAACAA
	2132	UCUUGUUG	CUGAUGA	X	GAA	AUUUUGUG	CACAAAUA	CAACAAGA
20	2150	CCUAAAAU	CUGAUGA	X	GAA	AUUCCCGG	CCGGGAUUU	AUUUUAGG
	2151	UCCUAAAA	CUGAUGA	X	GAA	AAUCCCGG	CGGGAAUUA	UUUUAGGA
	2153	GGUCCUAA	CUGAUGA	X	GAA	AUAAUUCC	GGAAUUUAU	UUAGGACC
	2154	UGGUCCUA	CUGAUGA	X	GAA	AAUAAUUC	GAAUUUAUU	UAGGACCA
	2155	CUGGUCCU	CUGAUGA	X	GAA	AAUAAUUC	AAUUUUUUU	AGGACCAG
25	2156	CCUGGUCC	CUGAUGA	X	GAA	AAAAUAAU	AUUUUUUUA	GGACCAGG
	2179	UUUCAAAU	CUGAUGA	X	GAA	ACAGCGUG	CACGUGUUU	UAUUGAAA
	2180	CUUUCAAU	CUGAUGA	X	GAA	AACAGCGU	ACGUGUUUU	AUUGAAAG
	2181	UCUUUCAA	CUGAUGA	X	GAA	AAACAGCG	CGCUGUUUA	UUGAAAGA
	2183	ACUCUUUC	CUGAUGA	X	GAA	AUAAACAG	CUGUUUAUU	GAAAGAGU
30	2192	UCCUCUGU	CUGAUGA	X	GAA	ACUCUUUC	GAAAGAGUC	ACAGAGGA
	2213	CACCUAUA	CUGAUGA	X	GAA	ACACCCUC	GAGGGUGUC	UAUAGGUG
	2215	GGCACCUA	CUGAUGA	X	GAA	AGACACCC	GGGUGUCUA	UAGGUGCC
	2217	UCGGCACC	CUGAUGA	X	GAA	AUAGACAC	GUGUCUAUA	GGUGCCGA

	2263	CGGUGAGG	CUGAUGA	X	GAA	AGGCUGCG	CGCAGCCUA	CCUCACCG
	2267	UGCACGGU	CUGAUGA	X	GAA	AGGUAGGC	GCCUACCUC	ACCGUGCA
	2284	ACUUGUCU	CUGAUGA	X	GAA	AGGUUCCU	AGGAACCUC	AGACAAGU
	2293	CCAGGUUU	CUGAUGA	X	GAA	ACUUGUCU	AGACAAGUC	AAACCUGG
5	2309	GUGAGCGU	CUGAUGA	X	GAA	AUCAGCUC	GAGCUGAUC	ACGCUCAC
	2315	GUGCACGU	CUGAUGA	X	GAA	AGCGUGAU	AUCACGCUC	ACGUGCAC
	2342	AGCCAAAA	CUGAUGA	X	GAA	AGGGUCGC	GCGACCCUC	UUUUGGCU
	2344	GGAGCCAA	CUGAUGA	X	GAA	AGAGGGUC	GACCCUCUU	UUGGCUC
	2345	AGGAGCCA	CUGAUGA	X	GAA	AAGAGGGU	ACCCUCUUU	UGGCUCU
10	2346	AAGGAGCC	CUGAUGA	X	GAA	AAAGAGGG	CCCUCUUUU	GGCUCUU
	2351	GUUAGAAG	CUGAUGA	X	GAA	AGCCAAAA	UUUUGGCUC	CUUCUAAC
	2354	AGAGUUAG	CUGAUGA	X	GAA	AGGAGCCA	UGGCUCUUU	CUAACUCU
	2355	GAGAGUUA	CUGAUGA	X	GAA	AAGGAGCC	GGCUCUUUC	UAACUCUC
	2357	AAGAGAGU	CUGAUGA	X	GAA	AGAAGGAG	CUCCUUCUA	ACUCUCUU
15	2361	GAUGAAGA	CUGAUGA	X	GAA	AGUUAGAA	UUCUAACUC	UCUUCAUC
	2363	CUGAUGAA	CUGAUGA	X	GAA	AGAGUUAG	CUAACUCUC	UUCAUCAG
	2365	UUCUGAUG	CUGAUGA	X	GAA	AGAGAGUU	AACUCUCUU	CAUCAGAA
	2366	UUUCUGAU	CUGAUGA	X	GAA	AAGAGAGU	ACUCUCUUC	AUCAGAAA
	2369	AGUUUUCU	CUGAUGA	X	GAA	AUGAAGAG	CUCUUCAUC	AGAAAACU
20	2386	CGGAAGAA	CUGAUGA	X	GAA	ACCGCUUC	GAAGCGGUC	UUCUCCG
	2388	UUCGGAAG	CUGAUGA	X	GAA	AGACCGCU	AGCGGUCUU	CUUCCGAA
	2389	CUUCGGAA	CUGAUGA	X	GAA	AAGACCGC	GCGGUCUUC	UUCCGAAG
	2391	UACUUCGG	CUGAUGA	X	GAA	AGAAGACC	GGUCUUCUU	CCGAAGUA
	2392	UUACUUCG	CUGAUGA	X	GAA	AAGAAGAC	GUCUUCUUC	CGAAGUAA
25	2399	UCUGUCUU	CUGAUGA	X	GAA	ACUUCGGA	UCCGAAGUA	AAGACAGA
	2410	UUGACAGG	CUGAUGA	X	GAA	AGUCUGUC	GACAGACUA	CCUGUCA
	2416	UAAUGAUU	CUGAUGA	X	GAA	ACAGGUAG	CUACCUGUC	AAUCAUUA
	2420	UCCAUAUU	CUGAUGA	X	GAA	AUUGACAG	CUGUCAAU	AUUAUGGA
	2423	GGGUCCAU	CUGAUGA	X	GAA	AUGAUUGA	UCAAUCAUU	AUGGACCC
30	2424	UGGGUCCA	CUGAUGA	X	GAA	AAUGAUUG	CAAUCAUUA	UGGACCCA
	2441	UCCAGGGG	CUGAUGA	X	GAA	ACUUCAUC	GAUGAAGUU	CCCCUGGA
	2442	AUCCAGGG	CUGAUGA	X	GAA	AACUUCAU	AUGAAGUUC	CCCUGGAU
	2473	UGGCAUCA	CUGAUGA	X	GAA	AGGGCAGC	GCUGCCCUA	UGAUGCCA

	2494	CCCGUGCA	CUGAUGA	X	GAA	ACUCCAC	GUGGGAGUU	UGCACGGG
	2495	UCCCGUGC	CUGAUGA	X	GAA	AACUCCCA	UGGGAGUUU	GCACGGGA
	2516	GAUUUGCC	CUGAUGA	X	GAA	AGUUUCAG	CUGAAACUA	GGCAAAUC
	2524	UUCCGAGC	CUGAUGA	X	GAA	AUUUGCCU	AGGCAAAUC	GCUCGGAA
5	2528	CCUCUUC	CUGAUGA	X	GAA	AGCGAUUU	AAAUCGCUC	GGAAGAGG
	2541	UUUCCCAA	CUGAUGA	X	GAA	AGCCCCUC	GAGGGGCUU	UUGGGAAA
	2542	CUUCCCCA	CUGAUGA	X	GAA	AAGCCCCU	AGGGGCUUU	UGGGAAAG
	2543	ACUUUCCC	CUGAUGA	X	GAA	AAAGCCCC	GGGGCUUUU	GGGAAAGU
	2552	GCUUGAAC	CUGAUGA	X	GAA	ACUUUCCC	GGGAAAGUC	GUUCAAGC
10	2555	GAGGCUUG	CUGAUGA	X	GAA	ACGACUUU	AAAGUCGUU	CAAGCCUC
	2556	AGAGGCUU	CUGAUGA	X	GAA	AACGACUU	AAGUCGUUC	AAGCCUCU
	2563	CAAAUGCA	CUGAUGA	X	GAA	AGGCUUGA	UCAAGCCUC	UGCAUUUG
	2569	UAAUGCCA	CUGAUGA	X	GAA	AUGCAGAG	CUCUGCAUU	UGGCAUUA
	2570	UUA AUGCC	CUGAUGA	X	GAA	AAUGCAGA	UCUGCAUUU	GGCAUUA
15	2576	GAUUUCUU	CUGAUGA	X	GAA	AUGCCAAA	UUUGGCAUU	AAGAAAUC
	2577	UGAUUUUC	CUGAUGA	X	GAA	AAUGCCAA	UUGGCAUUA	AGAAAUCA
	2584	AGGUGGGU	CUGAUGA	X	GAA	AUUUCUUA	UAAGAAAUC	ACCCACCU
	2617	CCUCUUUC	CUGAUGA	X	GAA	ACAUCUUC	GAAGAUGUU	GAAAGAGG
	2644	GAGCUUUG	CUGAUGA	X	GAA	ACUCACUG	CAGUGAGUA	CAAAGCUC
20	2652	GGUCAUCA	CUGAUGA	X	GAA	AGCUUUGU	ACAAAGCUC	UGAUGACC
	2666	AAGAUCUU	CUGAUGA	X	GAA	AGUUCGGU	ACCGAACUC	AAGAUCUU
	2672	UGGGUCA	CUGAUGA	X	GAA	AUCUUGAG	CUCAAGAUC	UUGACCCA
	2674	UGUGGGUC	CUGAUGA	X	GAA	AGAUCUUG	CAAGAUCUU	GACCCACA
	2684	UGAUGGCC	CUGAUGA	X	GAA	AUGUGGGU	ACCCACAUC	GGCCAUCA
25	2691	AUUCAGAU	CUGAUGA	X	GAA	AUGGCCGA	UCGGCCAUC	AUCUGAAU
	2694	CACAUUCA	CUGAUGA	X	GAA	AUGAUGGC	GCCAUCAUC	UGAAUGUG
	2705	AGGAGGUU	CUGAUGA	X	GAA	ACCACAUU	AAUGUGGUU	AACCUCCU
	2706	CAGGAGGU	CUGAUGA	X	GAA	AACCACAU	AUGUGGUUA	ACCUCCUG
	2711	GCUCCCAG	CUGAUGA	X	GAA	AGGUUAAC	GUUAACCUC	CUGGGAGC
30	2742	CACCAUCA	CUGAUGA	X	GAA	AGGCCUC	GAGGGCCUC	UGAUGGUG
	2753	UAUCCAC	CUGAUGA	X	GAA	AUCACCAU	AUGGUGAUC	GUGGAAUA
	2761	AUUUGCAG	CUGAUGA	X	GAA	AUCCACG	CGUGGAAUA	CUGCAAAU
	2770	GGUUUCCG	CUGAUGA	X	GAA	AUUUGCAG	CUGCAAAUA	CGGAAACC

167

	2782	GGUAGUUG	CUGAUGA	X	GAA	ACAGGUUU	AAACCUGUC	CAACUACC
	2788	UCUUGAGG	CUGAUGA	X	GAA	AGUUGGAC	GUCCAACUA	CCUCAAGA
	2792	UUGCUCUU	CUGAUGA	X	GAA	AGGUAGUU	AACUACCUC	AAGAGCAA
	2809	GACAGAAU	CUGAUGA	X	GAA	AGUCACGU	ACGUGACUU	AUUCUGUC
5	2810	AGACAGAA	CUGAUGA	X	GAA	AAGUCACG	CGUGACUUA	UUCUGUCU
	2812	UGAGACAG	CUGAUGA	X	GAA	AUAAGUCA	UGACUUAUU	CUGUCUCA
	2813	UUGAGACA	CUGAUGA	X	GAA	AAUAAGUC	GACUUAUUC	UGUCUCA
	2817	CUUGUUGA	CUGAUGA	X	GAA	ACAGAAUA	UAUUCUGUC	UCAACAAG
	2819	UCCUUGUU	CUGAUGA	X	GAA	AGACAGAA	UUCUGUCUC	AACAAGGA
10	2836	CCAU AUGC	CUGAUGA	X	GAA	AGGCUGCG	CGCAGCCUU	GCAUAUGG
	2841	GAGCUCCA	CUGAUGA	X	GAA	AUGCAAGG	CCUUGCAUA	UGGAGCUC
	2849	UCUUUCUU	CUGAUGA	X	GAA	AGCUCCAU	AUGGAGCUC	AAGAAAGA
	2900	ACACUGUC	CUGAUGA	X	GAA	AGGCGGGG	CCCCGCCUA	GACAGUGU
	2909	GAGCUGCU	CUGAUGA	X	GAA	ACACUGUC	GACAGUGUC	AGCAGCUC
15	2917	UGACACUU	CUGAUGA	X	GAA	AGCUGCUG	CAGCAGCUC	AAGUGUCA
	2924	GAGCUGGU	CUGAUGA	X	GAA	ACACUUGA	UCAAGUGUC	ACCAGCUC
	2932	GGAAGCUG	CUGAUGA	X	GAA	AGCUGGUG	CACCAGCUC	CAGCUUCC
	2938	CUUCAGGG	CUGAUGA	X	GAA	AGCUGGAG	CUCCAGCUU	CCCUGAAG
	2939	UCUUCAGG	CUGAUGA	X	GAA	AAGCUGGA	UCCAGCUUC	CCUGAAGA
20	2982	CUCACUGU	CUGAUGA	X	GAA	AUCCUCGU	ACGAGGAUU	ACAGUGAG
	2983	UCUCACUG	CUGAUGA	X	GAA	AAUCCUCG	CGAGGAUUA	CAGUGAGA
	2993	UGCUUGGA	CUGAUGA	X	GAA	AUCUCACU	AGUGAGAUU	UCCAAGCA
	2995	GCUGCUUG	CUGAUGA	X	GAA	AGAUCUCA	UGAGAUUCU	CAAGCAGC
	3008	UCCAUGGU	CUGAUGA	X	GAA	AGGGGCUG	CAGCCCCUC	ACCAUGGA
25	3026	CUGUAGGA	CUGAUGA	X	GAA	AUCAGGUC	GACCUGAUU	UCCUACAG
	3027	ACUGUAGG	CUGAUGA	X	GAA	AAUCAGGU	ACCUGAUUU	CCUACAGU
	3028	AACUGUAG	CUGAUGA	X	GAA	AAAUCAGG	CCUGAUUUC	CUACAGUU
	3031	GGAAACUG	CUGAUGA	X	GAA	AGGAAAUC	GAUUUCCUA	CAGUUUCC
	3036	CACUUGGA	CUGAUGA	X	GAA	ACUGUAGG	CCUACAGUU	UCCAAGUG
30	3037	CCACUUGG	CUGAUGA	X	GAA	AACUGUAG	CUACAGUUU	CCAAGUGG
	3038	GCCACUUG	CUGAUGA	X	GAA	AAACUGUA	UACAGUUUC	CAAGUGGC
	3061	AGGACAGA	CUGAUGA	X	GAA	ACUCCAUG	CAUGGAGUU	UCUGUCCU
	3062	GAGGACAG	CUGAUGA	X	GAA	AACUCCA	AUGGAGUUU	CUGUCCUC

	3063	GGAGGACA CUGAUGA X GAA AAACUCCA	UGGAGUUUC UGUCCUCC
	3067	UUCUGGAG CUGAUGA X GAA ACAGAAAC	GUUUCUGUC CUCCAGAA
	3070	ACUUUCUG CUGAUGA X GAA AGGACAGA	UCUGUCCUC CAGAAAGU
	3083	UCCCGAUG CUGAUGA X GAA AUGCACU	AAGUGCAU CAUCGGGA
5	3084	GUCCCGAU CUGAUGA X GAA AAUGCACU	AGUGCAUUC AUCGGGAC
	3087	CAGGUCCC CUGAUGA X GAA AUGAAUGC	GCAUUCAUC GGGACCUG
	3110	GAUAAAAG CUGAUGA X GAA AUGUUUCU	AGAAACAUC CUUUUAUC
	3113	UCAGAUAA CUGAUGA X GAA AGGAUGUU	AACAUCCU UUAUCUGA
	3114	CUCAGAU CUGAUGA X GAA AAGGAUGU	ACAUCCUU UAUCUGAG
10	3115	UCUCAGAU CUGAUGA X GAA AAAGGAUG	CAUCCUUU AUCUGAGA
	3116	UUCUCAGA CUGAUGA X GAA AAAAGGAU	AUCCUUUA UCUGAGAA
	3118	UGUUCUCA CUGAUGA X GAA AUAAAAGG	CCUUUAUC UGAGAACA
	3140	AAGUCGCA CUGAUGA X GAA AUCUUCAC	GUGAAGAU UGCGACU
	3141	AAAGUCGC CUGAUGA X GAA AAUCUUA	UGAAGAUU GCGACUU
15	3148	CCAGGCCA CUGAUGA X GAA AGUCGCAA	UUGCGACU UGGCCUGG
	3149	GCCAGGCC CUGAUGA X GAA AAGUCGCA	UGCGACUU GGCCUGGC
	3165	CUUAUAAA CUGAUGA X GAA AUCCCGGG	CCCGGGAU UUAUAAG
	3167	UUCUUAUA CUGAUGA X GAA AUAUCCCG	CGGGAUUA UAUAAGAA
	3168	GUUCUUAU CUGAUGA X GAA AAUAUCCC	GGGAUUAU AUAAGAAC
20	3169	GGUUCUUA CUGAUGA X GAA AAAUAUCC	GGAUUAUA UAAGAACC
	3171	AGGGUUCU CUGAUGA X GAA AUAAUAU	AUAUUUAUA AGAACCCU
	3183	CCUCACAU CUGAUGA X GAA AUCAGGGU	ACCCUGAU AUGUGAGG
	3184	UCCUCACA CUGAUGA X GAA AAUCAGGG	CCCUGAUUA UGUGAGGA
	3201	AAGUCGAG CUGAUGA X GAA AUCUCCUC	GAGGAGAU CUCGACU
25	3204	GGGAAGUC CUGAUGA X GAA AGUAUCUC	GAGAUACUC GACUCCCC
	3209	UUUAGGGG CUGAUGA X GAA AGUCGAGU	ACUCGACU CCCCUAAA
	3210	UUUUAGGG CUGAUGA X GAA AAGUCGAG	CUCGACUUC CCCUAAAA
	3215	AUCCAUUU CUGAUGA X GAA AGGGGAAG	CUUCCCCUA AAAUGGAU
	3228	GGAUUCAG CUGAUGA X GAA AGCCAUCC	GGAUGGCUC CUGAAUCC
30	3235	CAAAGAUG CUGAUGA X GAA AUUCAGGA	UCCUGAAUC CAUCUUUG
	3239	UUGUCAAA CUGAUGA X GAA AUGGAUUC	GAAUCCAUC UUUGACAA
	3241	CCUUGUCA CUGAUGA X GAA AGAUGGAU	AUCCAUCU UGACAAGG
	3242	ACCUUGUC CUGAUGA X GAA AAGAUGGA	UCCAUCUU GACAAGGU

	3251	GUGCUGUA	CUGAUGA	X	GAA	ACCUUGUC	GACAAGGUC	UACAGCAC
	3253	UGGUGCUG	CUGAUGA	X	GAA	AGACCUUG	CAAGGUCUA	CAGCACCA
	3277	CGCCAUAG	CUGAUGA	X	GAA	ACCACACA	UGUGUGGUC	CUAUGGGC
	3280	ACACGCCA	CUGAUGA	X	GAA	AGGACCAC	GUGGUCCUA	UGGCGUGU
5	3289	CCCACAGC	CUGAUGA	X	GAA	ACACGCCA	UGGCGUGUU	GCUGUGGG
	3302	AAGGAGAA	CUGAUGA	X	GAA	AUCUCCCA	UGGGAGAUC	UUCUCCUU
	3304	CUAAGGAG	CUGAUGA	X	GAA	AGAUCUCC	GGAGAUCUU	CUCCUUAG
	3305	CCUAAGGA	CUGAUGA	X	GAA	AAGAUCUC	GAGAUCUUC	UCCUUAGG
	3307	CCCCUAAG	CUGAUGA	X	GAA	AGAAGAUC	GAUCUUCUC	CUUAGGGG
10	3310	AACCCCCU	CUGAUGA	X	GAA	AGGAGAAG	CUUCUCCUU	AGGGGGUU
	3311	GAACCCCC	CUGAUGA	X	GAA	AAGGAGAA	UUCUCCUUA	GGGGGUUC
	3318	GUAUGGAG	CUGAUGA	X	GAA	ACCCCCUA	UAGGGGGUU	CUCCAUAC
	3319	GGUAUGGA	CUGAUGA	X	GAA	AACCCCCU	AGGGGGUUC	UCCAUACC
	3321	UGGGUAUG	CUGAUGA	X	GAA	AGAACCCC	GGGGUUCUC	CAUACCCA
15	3325	CUCCUGGG	CUGAUGA	X	GAA	AUGGAGAA	UUCUCCAUA	CCCAGGAG
	3352	GGCUGCAG	CUGAUGA	X	GAA	AGUCUUCA	UGAAGACUU	CUGCAGCC
	3353	CGGCUGCA	CUGAUGA	X	GAA	AAGUCUUC	GAAGACUUC	UGCAGCCG
	3397	GUGUGGCA	CUGAUGA	X	GAA	ACUCCGGG	CCCGGAGUA	UGCCACAC
	3413	AUUUGGUA	CUGAUGA	X	GAA	AUUUCAGG	CCUGAAAUC	UACCAAU
20	3415	UGAUUUGG	CUGAUGA	X	GAA	AGAUUUCA	UGAAAUCUA	CCAAAUCA
	3422	UCCAACAU	CUGAUGA	X	GAA	AUUUGGUA	UACCAAUUC	AUGUUGGA
	3427	AGCAAUCC	CUGAUGA	X	GAA	ACAUGAUU	AAUCAUGUU	GGAUUGCU
	3432	GUGCCAGC	CUGAUGA	X	GAA	AUCCAACA	UGUUGGAUU	GCUGGCAC
	3466	GUUCAGCA	CUGAUGA	X	GAA	ACCGGGGC	GCCCCGGUU	UGCUGAAC
25	3467	AGUUCAGC	CUGAUGA	X	GAA	AACCGGGG	CCCCGGUUU	GCUGAACU
	3476	UUCUCCAC	CUGAUGA	X	GAA	AGUUCAGC	GCUGAACUU	GUGGAGAA
	3488	AGGUCACC	CUGAUGA	X	GAA	AGUUCUC	GAGAAACUU	GGUGACCU
	3500	UUGGCUUG	CUGAUGA	X	GAA	AGCAGGUC	GACCUGCUU	CAAGCCAA
	3501	GUUGGCUU	CUGAUGA	X	GAA	AAGCAGGU	ACCUGCUUC	AAGCCAAC
30	3512	UCCUGUUG	CUGAUGA	X	GAA	ACGUUGGC	GCCAACGUC	CAACAGGA
	3531	GGGGAUGU	CUGAUGA	X	GAA	AUCUUUCC	GGAAAGAUU	ACAUCCCC
	3532	GGGGGAUG	CUGAUGA	X	GAA	AAUCUUUC	GAAAGAUUA	CAUCCCCC
	3536	UUGAGGGG	CUGAUGA	X	GAA	AUGUAAUC	GAUUACAUC	CCCCUCAA

	3542	AUGGCAUU	CUGAUGA	X	GAA	AGGGGGAU	AUCCCCCUC	AAUGCCAU
	3551	CUAGUCAG	CUGAUGA	X	GAA	AUGGCAUU	AAUGCCAU	CUGACUAG
	3558	ACUGUUUC	CUGAUGA	X	GAA	AGUCAGUA	UACUGACUA	GAAACAGU
	3567	UGUGAAGC	CUGAUGA	X	GAA	ACUGUUUC	GAAACAGUA	GCUUCACA
5	3571	AGUAUGUG	CUGAUGA	X	GAA	AGCUACUG	CAGUAGCUU	CACAUACU
	3572	GAGUAUGU	CUGAUGA	X	GAA	AAGCUACU	AGUAGCUUC	ACAUACUC
	3577	GGGUCGAG	CUGAUGA	X	GAA	AUGUGAAG	CUUCACAU	CUCGACCC
	3580	UGGGGGUC	CUGAUGA	X	GAA	AGUAUGUG	CACAUACUC	GACCCCCA
	3592	CCUCAGAG	CUGAUGA	X	GAA	AGGUGGGG	CCCCACCUU	CUCUGAGG
10	3593	UCCUCAGA	CUGAUGA	X	GAA	AAGGUGGG	CCCACCUUC	UCUGAGGA
	3595	GGUCCUCA	CUGAUGA	X	GAA	AGAAGGUG	CACCUUCUC	UGAGGACC
	3605	UCCUUGAA	CUGAUGA	X	GAA	AGGUCCUC	GAGGACCUU	UUCAAGGA
	3606	GUCCUUGA	CUGAUGA	X	GAA	AAGGUCCU	AGGACCUUU	UCAAGGAC
	3607	CGUCCUUG	CUGAUGA	X	GAA	AAAGGUCC	GGACCUUUU	CAAGGACG
15	3608	CCGUCCUU	CUGAUGA	X	GAA	AAAAGGUC	GACCUUUUC	AAGGACGG
	3619	GAUCUGCA	CUGAUGA	X	GAA	AGCCGUCC	GGACGGCUU	UGCAGAU
	3620	GGAUCUGC	CUGAUGA	X	GAA	AAGCCGUC	GACGGCUUU	GCAGAUCC
	3627	AAAUGUG	CUGAUGA	X	GAA	AUCUGCAA	UUGCAGAU	CACAUUUU
	3633	GGAAUGAA	CUGAUGA	X	GAA	AUGUGGAU	AUCCACAU	UUAUUC
20	3634	CGGAAUGA	CUGAUGA	X	GAA	AAUGUGGA	UCCACAUUU	UCAUUC
	3635	CCGGAAUG	CUGAUGA	X	GAA	AAAUGUGG	CCACAUUUU	CAUUC
	3636	UCCGGAAU	CUGAUGA	X	GAA	AAAUGUG	CACAUUUUC	AUUC
	3639	GCUUCCGG	CUGAUGA	X	GAA	AUGAAAAU	AUUUUCAU	CCGGAAGC
	3640	AGCUUCCG	CUGAUGA	X	GAA	AAUGAAAA	UUUUCAUUC	CGGAAGCU
25	3649	CAUCAUCA	CUGAUGA	X	GAA	AGCUUCCG	CGGAAGCUC	UGAUGAUG
	3664	CGUUUACA	CUGAUGA	X	GAA	AUCUCACA	UGUGAGAU	UGUAAACG
	3668	AAAGCGUU	CUGAUGA	X	GAA	ACAUUUCU	AGAUUUGUA	AACGCUUU
	3675	GAAUUUGA	CUGAUGA	X	GAA	AGCGUUUA	UAAACGCUU	UCAAUUC
	3676	UGAAUUUG	CUGAUGA	X	GAA	AAGCGUUU	AAACGCUUU	CAAAUUC
30	3677	AUGAAUUU	CUGAUGA	X	GAA	AAAGCGUU	AACGCUUUC	AAAUUCAU
	3682	GGCUCAUG	CUGAUGA	X	GAA	AUUUGAAA	UUUCAAAU	CAUGAGCC
	3683	AGGCUCAU	CUGAUGA	X	GAA	AAUUUGAA	UUCAAUUC	AUGAGCCU
	3701	AAGGUUUU	CUGAUGA	X	GAA	AUUCUUUC	GAAAGAAUC	AAAACCUU

171

	3709	GCUCCUCA CUGAUGA X GAA AGGUUUUG	CAAAACCUU UGAGGAGC
	3710	AGCUCCUC CUGAUGA X GAA AAGGUUUU	AAAACCUUU GAGGAGCU
	3719	UUCGGUGA CUGAUGA X GAA AGCUCCUC	GAGGAGCUU UCACCGAA
	3720	GUUCGGUG CUGAUGA X GAA AAGCUCCU	AGGAGCUUU CACCGAAC
5	3721	AGUUCGGU CUGAUGA X GAA AAAGCUCC	GGAGCUUUC ACCGAACU
	3730	UGGAGGUG CUGAUGA X GAA AGUUCGGU	ACCGAACUC CACCUCCA
	3736	CAAACAUG CUGAUGA X GAA AGGUGGAG	CUCCACCUC CAUGUUUG
	3742	AGUCCUCA CUGAUGA X GAA ACAUGGAG	CUCCAUGUU UGAGGACU
	3743	UAGUCCUC CUGAUGA X GAA AACAUUGA	UCCAUGUUU GAGGACUA
10	3751	CCAGCUGA CUGAUGA X GAA AGUCCUCA	UGAGGACUA UCAGCUGG
	3753	GUCCAGCU CUGAUGA X GAA AUAGUCCU	AGGACUAUC AGCUGGAC
	3765	CAGAGUGC CUGAUGA X GAA AGUGUCCA	UGGACACUA GCACUCUG
	3771	GCCCAGCA CUGAUGA X GAA AGUGCUG	CUAGCACUC UGCUGGGC
	3781	GCAAGGGG CUGAUGA X GAA AGCCCAGC	GCUGGGCUC CCCCUUGC
15	3787	GCUUCAGC CUGAUGA X GAA AGGGGGAG	CUCCCCCUU GCUGAAGC
	3799	UCCAGGUG CUGAUGA X GAA ACCGCUUC	GAAGCGGUU CACCUGGA
	3800	GUCCAGGU CUGAUGA X GAA AACCGPUU	AAGCGGUUC ACCUGGAC
	3829	UCUUCAUG CUGAUGA X GAA AGGCCUUG	CAAGGCCUC CAUGAAGA
	3839	CUCAAGUC CUGAUGA X GAA AUCUUCAU	AUGAAGAUU GACUUGAG
20	3844	CUAUUCUC CUGAUGA X GAA AGUCUAUC	GAUAGACUU GAGAAUAG
	3851	UUACUCGC CUGAUGA X GAA AUUCUCAA	UUGAGAAUA GCGAGUAA
	3858	CUUGCUUU CUGAUGA X GAA ACUCGCUA	UAGCGAGUA AAAGCAAG
	3878	AGAUCGGA CUGAUGA X GAA AGUCCCGC	GCGGGACUU UCCGAUCU
	3879	CAGAUCCG CUGAUGA X GAA AAGUCCCG	CGGGACUUU CCGAUCUG
25	3880	GCAGAUCC CUGAUGA X GAA AAAGUCCC	GGGACUUUC CGAUCUGC
	3885	CCUCGGCA CUGAUGA X GAA AUCGGAAA	UUUCCGAUC UGCCGAGG
	3901	AGAAGCAG CUGAUGA X GAA AGCUGGGC	GCCCAGCUU CUGCUUCU
	3902	GAGAAGCA CUGAUGA X GAA AAGCUGGG	CCCAGCUUC UGCUUCUC
	3907	AGCUGGAG CUGAUGA X GAA AGCAGAAG	CUUCUGCUU CUCCAGCU
30	3908	CAGCUGGA CUGAUGA X GAA AAGCAGAA	UUCUGCUUC UCCAGCUG
	3910	CACAGCUG CUGAUGA X GAA AGAAGCAG	CUGCUUCUC CAGCUGUG
	3926	ACGGGCCU CUGAUGA X GAA AUGUGGCC	GGCCACAUC AGGCCCGU
	3949	CCAGCUCA CUGAUGA X GAA AUUCAUCG	CGAUGAAUC UGAGCUGG

	3967	AACAGCAG	CUGAUGA	X	GAA	ACUCCUUU	AAAGGAGUC	CUGCUGUU
	3975	GGGUGGAG	CUGAUGA	X	GAA	ACAGCAGG	CCUGCUGUU	CUCCACCC
	3976	GGGGUGGA	CUGAUGA	X	GAA	AACAGCAG	CUGCUGUUC	UCCACCCC
	3978	UGGGGGUG	CUGAUGA	X	GAA	AGAACAGC	GCUGUUCUC	CACCCCCA
5	3991	CGGAGUUG	CUGAUGA	X	GAA	AGUCUGGG	CCCAGACUA	CAACUCCG
	3997	ACACCACG	CUGAUGA	X	GAA	AGUUGUAG	CUACAACUC	CGUGGUGU
	4006	AGGAGUAC	CUGAUGA	X	GAA	ACACCACG	CGUGGUGUU	GUACUCCU
	4009	GGGAGGAG	CUGAUGA	X	GAA	ACAACACC	GGUGUUGUA	CUCCUCCC
	4012	GCGGGGAG	CUGAUGA	X	GAA	AGUACAAC	GUUGUACUC	CUCCCCGC
10	4015	CGGGCGGG	CUGAUGA	X	GAA	AGGAGUAC	GUACUCCUC	CCCGCCCCG
	4027	AGAAGCUU	CUGAUGA	X	GAA	AGGCGGGC	GCCCCCUA	AAGCUUCU
	4033	CUGGUGAG	CUGAUGA	X	GAA	AGCUUUAG	CUAAAGCUU	CUCACCAG
	4034	GCUGGUGA	CUGAUGA	X	GAA	AAGCUUUA	UAAAGCUUC	UCACCAGC
	4036	GGGCUGGU	CUGAUGA	X	GAA	AGAAGCUU	AAGCUUCUC	ACCAGCCC
15	4066	AUGUAUAA	CUGAUGA	X	GAA	ACUGUCAG	CUGACAGUA	UUAUACAU
	4068	AGAUGUAU	CUGAUGA	X	GAA	AUACUGUC	GACAGUAUU	AUACAUCU
	4069	UAGAUGUA	CUGAUGA	X	GAA	AAUACUGU	ACAGUAUUA	UACAUCUA
	4071	CAUAGAUG	CUGAUGA	X	GAA	AUAAUACU	AGUAUUUAU	CAUCUAUG
	4075	AACUCAUA	CUGAUGA	X	GAA	AUGUAUAA	UUAUACAUC	UAUGAGUU
20	4077	UAAACUCA	CUGAUGA	X	GAA	AGAUGUAU	AUACAUCUA	UGAGUUUA
	4083	UAGGUGUA	CUGAUGA	X	GAA	ACUCAUAG	CUAUGAGUU	UACACCUA
	4084	AUAGGUGU	CUGAUGA	X	GAA	AACUCAUA	UAUGAGUUU	ACACCUAU
	4085	AAUAGGUG	CUGAUGA	X	GAA	AAACUCAU	AUGAGUUUA	CACCUAUU
	4091	GAGCGGAA	CUGAUGA	X	GAA	AGGUGUAA	UUACACCUA	UUCCGCUC
25	4093	UGGAGCGG	CUGAUGA	X	GAA	AUAGGUGU	ACACCUAUU	CCGCUCCA
	4094	GUGGAGCG	CUGAUGA	X	GAA	AAUAGGUG	CACCUAUUC	CGCUCCAC
	4099	CUCCUGUG	CUGAUGA	X	GAA	AGCGGAAU	AUCCGCUC	CACAGGAG
	4117	GUCACGAA	CUGAUGA	X	GAA	AGCAGCUG	CAGCUGCUU	UUCGUGAC
	4118	GGUCACGA	CUGAUGA	X	GAA	AAGCAGCU	AGCUGCUUU	UCGUGACC
30	4119	AGGUCACG	CUGAUGA	X	GAA	AAAGCAGC	GCUGCUUUU	CGUGACCU
	4120	AAGGUCAC	CUGAUGA	X	GAA	AAAAGCAG	CUGCUUUUC	GUGACCUU
	4128	CACGAUUA	CUGAUGA	X	GAA	AGGUCACG	CGUGACCUU	UAAUCGUG
	4129	GCACGAUU	CUGAUGA	X	GAA	AAGGUCAC	GUGACCUUU	AAUCGUGC

173

	4130	AGCACGAU	CUGAUGA	X	GAA	AAAGGUCA	UGACCUUUA	AUCGUGCU
	4133	AAAAGCAC	CUGAUGA	X	GAA	AUUAAGG	CCUUAAUC	GUGCUUUU
	4139	AAACAAA	CUGAUGA	X	GAA	AGCACGAU	AUCGUGCUU	UUUGUUU
	4140	AAAACAAA	CUGAUGA	X	GAA	AAGCACGA	UCGUGCUUU	UUUGUUUU
5	4141	AAAAACAA	CUGAUGA	X	GAA	AAAGCACG	CGUGCUUUU	UUGUUUUU
	4142	AAAAAACA	CUGAUGA	X	GAA	AAAAGCAC	GUGCUUUUU	UGUUUUUU
	4143	CAAAAAAC	CUGAUGA	X	GAA	AAAAAGCA	UGCUIUUUU	GUUUUUUG
	4146	AAACAAA	CUGAUGA	X	GAA	ACAAAAA	UUUUUGUU	UUUGUUU
	4147	AAAAACAA	CUGAUGA	X	GAA	AACAAAA	UUUUUGUUU	UUUGUUUU
10	4148	CAAAACAA	CUGAUGA	X	GAA	AAACAAA	UUUUGUUUU	UUGUUUUG
	4149	ACAAACA	CUGAUGA	X	GAA	AAAACAA	UUUGUUUUU	UGUUUUUGU
	4150	AACAAAAC	CUGAUGA	X	GAA	AAAAACAA	UUGUUUUUU	GUUUUGUU
	4153	ACAAACAA	CUGAUGA	X	GAA	ACAAAAA	UUUUUGUUU	UUGUUUGU
	4154	AACAAACA	CUGAUGA	X	GAA	AACAAAA	UUUUUGUUU	UGUUUGUU
15	4155	CAACAAAC	CUGAUGA	X	GAA	AAACAAA	UUUUGUUUU	GUUUGUUG
	4158	CAACAACA	CUGAUGA	X	GAA	ACAAAACA	UGUUUGUUU	UGUUGUUG
	4159	GCAACAAC	CUGAUGA	X	GAA	AACAAAC	GUUUUGUUU	GUUGUUGC
	4162	ACAGCAAC	CUGAUGA	X	GAA	ACAAACAA	UUGUUUGUU	GUUGCUGU
	4165	AAAACAGC	CUGAUGA	X	GAA	ACAACAAA	UUUGUUGUU	GCUGUUUU
20	4171	UUAGUCA	CUGAUGA	X	GAA	ACAGCAAC	GUUGCUGUU	UUGACUAA
	4172	GUUAGUCA	CUGAUGA	X	GAA	AACAGCAA	UUGCUGUUU	UGACUAAC
	4173	UGUUAGUC	CUGAUGA	X	GAA	AAACAGCA	UGCUGUUUU	GACUAACA
	4178	AUUCUUGU	CUGAUGA	X	GAA	AGUCAAAA	UUUUGACUA	ACAAGAAU
	4189	ACUGGGGU	CUGAUGA	X	GAA	ACAUUCUU	AAGAAUGUA	ACCCCAGU
25	4198	ACGUCACU	CUGAUGA	X	GAA	ACUGGGGU	ACCCCAGUU	AGUGACGU
	4199	CACGUCAC	CUGAUGA	X	GAA	AACUGGGG	CCCCAGUUA	GUGACGUG
	4216	AACAAUAG	CUGAUGA	X	GAA	AUUCUUCA	UGAAGAAUA	CUAUUGUU
	4219	UCUAACAA	CUGAUGA	X	GAA	AGUAUUCU	AGAAUACUA	UUGUUAGA
	4221	UCUCUAAC	CUGAUGA	X	GAA	AUAGUAUU	AAUACUAUU	GUUAGAGA
30	4224	AUUUCUCU	CUGAUGA	X	GAA	ACAAUAGU	ACUAUUGUU	AGAGAAAU
	4225	GAUUUCUC	CUGAUGA	X	GAA	AACAAUAG	CUAUUGUUA	GAGAAAUC
	4233	GCGGGGGG	CUGAUGA	X	GAA	AUUUCUCU	AGAGAAAUC	CCCCCGC
	4249	GUUACCCU	CUGAUGA	X	GAA	AGGCUUUG	CAAAGCCUC	AGGGUAAC

	4255	GUCCAGGU	CUGAUGA	X	GAA	ACCCUGAG	CUCAGGGUA	ACCUGGAC
	4282	GGUCGCCA	CUGAUGA	X	GAA	AGGCACCU	AGGUGCCUC	UGGCGACC
	4323	GCUGCAGG	CUGAUGA	X	GAA	AGGGUGGG	CCCACCCUC	CCUGCAGC
	4341	ACUGCCUC	CUGAUGA	X	GAA	AGUCCAC	GUGGGACUA	GAGGCAGU
5	4350	AAUGGGCU	CUGAUGA	X	GAA	ACUGCCUC	GAGGCAGUA	AGCCCAUU
	4358	CAUGAGCU	CUGAUGA	X	GAA	AUGGGCUU	AAGCCCAUU	AGCUCAUG
	4359	CCAUGAGC	CUGAUGA	X	GAA	AAUGGGCU	AGCCCAUUA	GCUCAUGG
	4363	GCAGCCAU	CUGAUGA	X	GAA	AGCUAAUG	CAUUAGCUC	AUGGCUGC
	4387	GAGAGACA	CUGAUGA	X	GAA	AGCAGGUC	GACCUGCUC	UGUCUCUC
10	4391	AUAAGAGA	CUGAUGA	X	GAA	ACAGAGCA	UGCUCUGUC	UCUCUUAU
	4393	CCAUAAGA	CUGAUGA	X	GAA	AGACAGAG	CUCUGUCUC	UCUUAUGG
	4395	CUCCAUA	CUGAUGA	X	GAA	AGAGACAG	CUGUCUCUC	UUAUGGAG
	4397	UCCUCCAU	CUGAUGA	X	GAA	AGAGAGAC	GUCUCUCUU	AUGGAGGA
	4398	UUCUCCA	CUGAUGA	X	GAA	AAGAGAGA	UCUCUCUUA	UGGAGGAA
15	4445	GCAUCCCA	CUGAUGA	X	GAA	AGCCUUUU	AAAAGGCUU	UGGGAUGC
	4446	CGCAUCCC	CUGAUGA	X	GAA	AAGCCUUU	AAAGGCUUU	GGGAUGCG
	4456	ACAGGACG	CUGAUGA	X	GAA	ACGCAUCC	GGAUGCGUC	CGUCCUGU
	4460	CUCCACAG	CUGAUGA	X	GAA	ACGGACGC	GCGUCCGUC	CUGUGGAG
	4487	GCAUAGCG	CUGAUGA	X	GAA	AGCCCCCU	AGGGGGCUC	CGCUAUGC
20	4492	AAGUGGCA	CUGAUGA	X	GAA	AGCGGAGC	GCUCCGCUA	UGCCACUU
	4500	AGUCACUG	CUGAUGA	X	GAA	AGUGGCAU	AUGCCACUU	CAGUGACU
	4501	AAGUCACU	CUGAUGA	X	GAA	AAGUGGCA	UGCCACUUC	AGUGACUU
	4509	GGAGUGAG	CUGAUGA	X	GAA	AGUCACUG	CAGUGACUU	CUCACUCC
	4510	AGGAGUGA	CUGAUGA	X	GAA	AAGUCACU	AGUGACUUC	UCACUCCU
25	4512	CCAGGAGU	CUGAUGA	X	GAA	AGAAGUCA	UGACUUCUC	ACUCCUGG
	4516	GAGGCCAG	CUGAUGA	X	GAA	AGUGAGAA	UUCUCACUC	CUGGCCUC
	4524	AAACAGCG	CUGAUGA	X	GAA	AGGCCAGG	CCUGGCCUC	CGCUGUUU
	4531	GGGCCCCG	CUGAUGA	X	GAA	ACAGCGGA	UCCGCUGUU	UCGGGCCC
	4532	GGGGCCCC	CUGAUGA	X	GAA	AACAGCGG	CCGCUGUUU	CGGGCCCC
30	4533	GGGGGCCC	CUGAUGA	X	GAA	AAACAGCG	CGCUGUUUC	GGGGCCCC
	4543	CCUCUUGG	CUGAUGA	X	GAA	AGGGGGCC	GGCCCCCUU	CCAAGAGG
	4544	ACCUCUUG	CUGAUGA	X	GAA	AAGGGGGC	GCCCCCUUC	CAAGAGGU
	4553	UGCUCUGA	CUGAUGA	X	GAA	ACCUCUUG	CAAGAGGUA	UCAGAGCA

	4555	UCUGCUCU	CUGAUGA	X	GAA	AUACCUCU	AGAGGUAUC	AGAGCAGA
	4577	GUCUAGGA	CUGAUGA	X	GAA	ACGUCCCU	AGGGACGUU	UCCUAGAC
	4578	GGUCUAGG	CUGAUGA	X	GAA	AACGUCCC	GGGACGUUU	CCUAGACC
	4579	UGGUCUAG	CUGAUGA	X	GAA	AAACGUCC	GGACGUUUC	CUAGACCA
5	4582	CCCUGGUC	CUGAUGA	X	GAA	AGGAAACG	CGUUUCCUA	GACCAGGG
	4598	UUCCCGAG	CUGAUGA	X	GAA	ACAUGUGC	GCACAUUUU	CUCGGGAA
	4599	GUUCCCGA	CUGAUGA	X	GAA	AACAUGUG	CACAUGUUC	UCGGGAAC
	4601	UGGUUCCC	CUGAUGA	X	GAA	AGAACAUG	CAUGUUCUC	GGGAACCA
	4614	UUAAGAUU	CUGAUGA	X	GAA	ACUGUGGU	ACCACAGUU	AAUCUUAA
10	4615	UUUAAGAU	CUGAUGA	X	GAA	AACUGUGG	CCACAGUUA	AUCUUAAA
	4618	AGAUUUAA	CUGAUGA	X	GAA	AUUAACUG	CAGUUAAUC	UUAAAUCU
	4620	AAAGAUUU	CUGAUGA	X	GAA	AGAUUAAC	GUUAAUCUU	AAAUCUUU
	4621	AAAAGAUU	CUGAUGA	X	GAA	AAGAUUAA	UUAUCUUA	AAUCUUUU
	4625	CGGGAAAA	CUGAUGA	X	GAA	AUUUAAGA	UCUUAUAUC	UUUUCCCC
15	4627	CCCCGGGA	CUGAUGA	X	GAA	AGAUUUAA	UUAAAUCUU	UUCCCCGG
	4628	UCCCCGGA	CUGAUGA	X	GAA	AAGAUUUA	UAAAUCUUU	UCCCCGGA
	4629	CUCCCCGG	CUGAUGA	X	GAA	AAAGAUUU	AAAUCUUUU	CCCCGGAG
	4630	ACUCCCCG	CUGAUGA	X	GAA	AAAAGAUU	AAUCUUUUC	CCGGGAGU
	4639	CAACAGAA	CUGAUGA	X	GAA	ACUCCCCG	CCGGGAGUC	UUCUGUUG
20	4641	GACAACAG	CUGAUGA	X	GAA	AGACUCCC	GGGAGUCUU	CUGUUGUC
	4642	AGACAACA	CUGAUGA	X	GAA	AAGACUCC	GGAGUCUUC	UGUUGUCU
	4646	AAACAGAC	CUGAUGA	X	GAA	ACAGAAGA	UCUUCUGUU	GUCUGUUU
	4649	GGUAAACA	CUGAUGA	X	GAA	ACAACAGA	UCUGUUGUC	UGUUUACC
	4653	GGAUGGUA	CUGAUGA	X	GAA	ACAGACAA	UUGUCUGUU	UACCAUCC
25	4654	UGGAUGGU	CUGAUGA	X	GAA	AACAGACA	UGUCUGUUU	ACCAUCCA
	4655	UUGGAUGG	CUGAUGA	X	GAA	AAACAGAC	GUCUGUUUA	CCAUCCAA
	4660	AUGCUUUG	CUGAUGA	X	GAA	AUGGUAAA	UUUACCAUC	CAAAGCAU
	4669	AUGUUAAA	CUGAUGA	X	GAA	AUGCUUUG	CAAAGCAUA	UUUAACAU
	4671	ACAUGUUA	CUGAUGA	X	GAA	AUAUGCUU	AAGCAUAUU	UAACAUGU
30	4672	CACAUGUU	CUGAUGA	X	GAA	AAUAUGCU	AGCAUAUUU	AACAUGUG
	4673	ACACAUGU	CUGAUGA	X	GAA	AAUAUGC	GCAUAUUUA	ACAUGUGU
	4682	CCCCCACU	CUGAUGA	X	GAA	ACACAUGU	ACAUGUGUC	AGUGGGGG
	4698	CAGAAGCC	CUGAUGA	X	GAA	AGCGCCAC	GUGGCGCUU	GGCUUCUG

176

	4703	GGCCUCAG CUGAUGA X GAA AGCCAAGC	GCUUGGCUU CUGAGGCC
	4704	UGGCCUCA CUGAUGA X GAA AAGCCAAG	CUUGGCUUC UGAGGCCA
	4720	GAACUGAU CUGAUGA X GAA AUGGCUCU	AGAGCCAUC AUCAGUUC
	4723	GAGGAACU CUGAUGA X GAA AUGAUGGC	GCCAUCAUC AGUUCCUC
5	4727	ACUAGAGG CUGAUGA X GAA ACUGAUGA	UCAUCAGUU CCUCUAGU
	4728	CACUAGAG CUGAUGA X GAA AACUGAUG	CAUCAGUUC CUCUAGUG
	4731	UCUCACUA CUGAUGA X GAA AGGAACUG	CAGUUCCUC UAGUGAGA
	4733	CAUCUCAC CUGAUGA X GAA AGAGGAAC	GUUCCUCUA GUGAGAUG
	4745	AUGACCUC CUGAUGA X GAA AUGCAUCU	AGAUGCAUU GAGGUCAU
10	4751	UUGGGUUA CUGAUGA X GAA ACCUCAAU	AUUGAGGUC AUACCCAA
	4754	AGCUUGGG CUGAUGA X GAA AUGACCUC	GAGGUCAUA CCCAAGCU
	4763	AGGCCUGC CUGAUGA X GAA AGCUUGGG	CCCAAGCUU GCAGGCCU
	4777	AGUAUGCG CUGAUGA X GAA AGGUCAGG	CCUGACCUU CGCAUACU
	4778	CAGUAUGC CUGAUGA X GAA AAGUCAG	CUGACCUUC GCAUACUG
15	4783	GUGAGCAG CUGAUGA X GAA AUGCGAAG	CUUCGCAUA CUGCUCAC
	4789	CUCCCCGU CUGAUGA X GAA AGCAGUAU	AUACUGCUC ACGGGGAG
	4799	GACCACUU CUGAUGA X GAA ACUCCCCG	CGGGGAGUU AAGUGGUC
	4800	GGACCACU CUGAUGA X GAA AACUCCCC	GGGGAGUUA AGUGGUCC
	4807	CCAAACUG CUGAUGA X GAA ACCACUUA	UAAGUGGUC CAGUUUGG
20	4812	CUAGGCCA CUGAUGA X GAA ACUGGACC	GGUCCAGUU UGGCCUAG
	4813	ACUAGGCC CUGAUGA X GAA AACUGGAC	GUCCAGUUU GGCCUAGU
	4819	AACCUUAC CUGAUGA X GAA AGGCCAAA	UUUGGCCUA GUAAGGUU
	4822	GGCAACCU CUGAUGA X GAA ACUAGGCC	GGCCUAGUA AGGUUGCC
	4827	CAGUAGGC CUGAUGA X GAA ACCUUACU	AGUAAGGUU GCCUACUG
25	4832	CCCAUCAG CUGAUGA X GAA AGGCAACC	GGUUGCCUA CUGAUGGG
	4843	UGGCUUUU CUGAUGA X GAA AGCCCAUC	GAUGGGCUC AAAAGCCA
	4855	CUGUUUAA CUGAUGA X GAA AUGUGGCU	AGCCACAUU UUAACAG
	4856	CCUGUUUA CUGAUGA X GAA AAUGUGGC	GCCACAUUU UAAACAGG
	4857	ACCGUUUU CUGAUGA X GAA AAAUGUGG	CCACAUUUU AAACAGGU
30	4858	AACCGUUU CUGAUGA X GAA AAAAUGUG	CACAUUUUA AACAGGUU
	4866	UGAGAUAA CUGAUGA X GAA ACCUGUUU	AAACAGGUU UUAUCUCA
	4867	UUGAGAUU CUGAUGA X GAA AACCUGUU	AACAGGUUU UAUCUCAA
	4868	CUUGAGAU CUGAUGA X GAA AAACCUGU	ACAGGUUUU AUCUCAAG

	4869	ACUUGAGA CUGAUGA X GAA AAAACCUG	CAGGUUUUA UCUCAAGU
	4871	AUACUUGA CUGAUGA X GAA AUAAAACC	GGUUUUUUAUC UCAAGUAU
	4873	UAAUACUU CUGAUGA X GAA AGAUAAAA	UUUUUUCUC AAGUAUUA
	4878	UAUAUUAA CUGAUGA X GAA ACUUGAGA	UCUCAAGUA UUAUAUA
5	4880	UAUAUAUU CUGAUGA X GAA AUACUUGA	UCAAGUAUU AAUAUAUA
	4881	CUAUAUAU CUGAUGA X GAA AAUACUUG	CAAGUAUUA AUUAUAUG
	4884	UGUCUAUA CUGAUGA X GAA AUUAAUAC	GUAUUAAUA UUAAGACA
	4886	CUUGUCUA CUGAUGA X GAA AUUAUAAU	AUUAAUAUA UAGACAAG
	4888	GUCUUGUC CUGAUGA X GAA AUUAUAUA	UAAUAUAUA GACAAGAC
10	4900	UAAUGCAU CUGAUGA X GAA AGUGUCUU	AAGACACUU AUGCAUUA
	4901	AUAAUGCA CUGAUGA X GAA AAGUGUCU	AGACACUUA UGCAUUAU
	4907	AACAGGAU CUGAUGA X GAA AUGCAUAA	UUAUGCAUU AUCCUGUU
	4908	AAACAGGA CUGAUGA X GAA AAUGCAUA	UAUGCAUUA UCCUGUUU
	4910	UAAACAG CUGAUGA X GAA AUAAUGCA	UGCAUUAUC CUGUUUUA
15	4915	AUAUAUAA CUGAUGA X GAA ACAGGAUA	UAUCCUGUU UUAUAUAU
	4916	GAUAUAUA CUGAUGA X GAA AACAGGAU	AUCCUGUUU UUAUAUAUC
	4917	GGAUUAUA CUGAUGA X GAA AAACAGGA	UCCUGUUUU AUUAUCC
	4918	UGGAUAUA CUGAUGA X GAA AAAACAGG	CCUGUUUUA UUAUCCA
	4920	AUUGGAUA CUGAUGA X GAA AUAAAACA	UGUUUUUAU UAUCCAAU
20	4922	UCAUUGGA CUGAUGA X GAA AUUAUAAA	UUUUUAUAU UCCAAUGA
	4924	AUUCAUUG CUGAUGA X GAA AUUAUAUA	UUUAUAUUC CAAUGAAU
	4933	CCCAGUUA CUGAUGA X GAA AUUCAUUG	CAAUGAAUA UAACUGGG
	4935	GCCCCAGU CUGAUGA X GAA AUUAUUAU	AUGAAUAUA ACUGGGGC
	4948	UGACUCUU CUGAUGA X GAA ACUCGCCC	GGGCGAGUU AAGAGUCA
25	4949	AUGACUCU CUGAUGA X GAA AACUCGCC	GGCGAGUUA AGAGUCAU
	4955	UAGACCAU CUGAUGA X GAA ACUCUUAU	UUAAGAGUC AUGGUCUA
	4961	CUUUUCUA CUGAUGA X GAA ACCAUGAC	GUCAUGGUC UAGAAAAG
	4963	CCCUUUUC CUGAUGA X GAA AGACCAUG	CAUGGUCUA GAAAAGGG
	4974	UACAGAGA CUGAUGA X GAA ACCCCUUU	AAAGGGGUU UCUCUGUA
30	4975	GUACAGAG CUGAUGA X GAA AACCCCUU	AAGGGGUUU CUCUGUAC
	4976	GGUACAGA CUGAUGA X GAA AAACCCCU	AGGGGUUUC UCUGUACC
	4978	UGGGUACA CUGAUGA X GAA AGAAACCC	GGGUUUCUC UGUACCCA
	4982	GAUUUGGG CUGAUGA X GAA ACAGAGAA	UUCUCUGUA CCCAAUUC

	4990	ACCAGCCC	CUGAUGA	X	GAA	AUUUGGGU	ACCCAAAUC	GGGCUGGU
	4999	CUUGGUCC	CUGAUGA	X	GAA	ACCAGCCC	GGGCUGGUU	GGACCAAG
	5029	GCUGGGAC	CUGAUGA	X	GAA	ACCACUCU	AGAGUGGUU	GUCCCAGC
	5032	AUAGCUGG	CUGAUGA	X	GAA	ACAACCAC	GUGGUUGUC	CCAGCUAU
5	5039	AGUAACTA	CUGAUGA	X	GAA	AGCUGGGA	UCCCAGCTA	UAGUUACU
	5041	UUAGUAAC	CUGAUGA	X	GAA	AUAGCUGG	CCAGCUAUA	GUUACUAA
	5044	AGUUUAGU	CUGAUGA	X	GAA	ACUAUAGC	GCUAUAGUU	ACUAAACU
	5045	UAGUUUAG	CUGAUGA	X	GAA	AACUAUAG	CUAUAGUUA	CUAAACUA
	5048	GAGUAGUU	CUGAUGA	X	GAA	AGUAACTA	UAGUUACUA	AACUACUC
10	5053	UGGGUGAG	CUGAUGA	X	GAA	AGUUUAGU	ACUAAACUA	CUCACCCA
	5056	CUUUGGGU	CUGAUGA	X	GAA	AGUAGUUU	AAACUACUC	ACCCAAAG
	5066	GAGGUCCC	CUGAUGA	X	GAA	ACUUUGGG	CCCAAAGUU	GGGACCUC
	5074	AAGCCAGU	CUGAUGA	X	GAA	AGGUCCCA	UGGGACCUC	ACUGGCTUU
	5082	GUAAAGAG	CUGAUGA	X	GAA	AGCCAGUG	CACUGGCTU	CUCUUUAC
15	5083	AGUAAAGA	CUGAUGA	X	GAA	AAGCCAGU	ACUGGCTUC	UCUUUACU
	5085	GAAGUAAA	CUGAUGA	X	GAA	AGAAGCCA	UGGCUUCUC	UUUACUUC
	5087	AUGAAGUA	CUGAUGA	X	GAA	AGAGAAGC	GCUUCUCUU	UACUUCAU
	5088	GAUGAAGU	CUGAUGA	X	GAA	AAGAGAAG	CUUCUCUUU	ACUUCAUC
	5089	UGAUGAAG	CUGAUGA	X	GAA	AAAGAGAA	UUCUCUUUA	CUUCAUCA
20	5092	CCAUGAUG	CUGAUGA	X	GAA	AGUAAAGA	UCUUUACUU	CAUCAUGG
	5093	UCCAUGAU	CUGAUGA	X	GAA	AAGUAAAG	CUUUACUUC	AUCAUGGA
	5096	AAAUCCAU	CUGAUGA	X	GAA	AUGAAGUA	UACUUCAUC	AUGGAUUU
	5103	GAUGGUGA	CUGAUGA	X	GAA	AUCCAUGA	UCAUGGAUU	UCACCAUC
	5104	GGAUGGUG	CUGAUGA	X	GAA	AAUCCAUG	CAUGGAUUU	CACCAUCC
25	5105	GGAUGGGU	CUGAUGA	X	GAA	AAAUCCAU	AUGGAUUUC	ACCAUCCC
	5111	UGCCUUGG	CUGAUGA	X	GAA	AUGGUGAA	UUCACCAUC	CCAAGGCA
	5122	UCCUCUCA	CUGAUGA	X	GAA	ACUGCCUU	AAGGCAGUC	UGAGAGGA
	5134	AUACUCUU	CUGAUGA	X	GAA	AGCUCCUC	GAGGAGCTA	AAGAGUAU
	5141	UGGGCUGA	CUGAUGA	X	GAA	ACUCUUUA	UAAAGAGUA	UCAGCCCCA
30	5143	UAUGGGCU	CUGAUGA	X	GAA	AUACUCUU	AAGAGUAUC	AGCCCAUA
	5151	UUAAUAAA	CUGAUGA	X	GAA	AUGGGCUG	CAGCCCAUA	UUUAUUAA
	5153	GCUUAAUA	CUGAUGA	X	GAA	AUAUGGGC	GCCCAUAUU	UAUUAAGC
	5154	UGCUUAAU	CUGAUGA	X	GAA	AAUAUGGG	CCCAUAUUU	AUUAAGCA

	5155	GUGCUUAA	CUGAUGA	X	GAA	AAUAUUGG	CCAUUUUA	UUAAGCAC
	5157	AAGUGCUU	CUGAUGA	X	GAA	AUAAAUAU	AUAUUUAU	AAGCACUU
	5158	AAAGUGCU	CUGAUGA	X	GAA	AAUAAUA	UAUUUAUA	AGCACUUU
	5165	GGAGCAUA	CUGAUGA	X	GAA	AGUGCUUA	UAAGCACUU	UAUGCUCU
5	5166	AGGAGCAU	CUGAUGA	X	GAA	AAGUGCUU	AAGCACUUU	AUGCUCUU
	5167	AAGGAGCA	CUGAUGA	X	GAA	AAAGUGCU	AGCACUUUA	UGCUCUUU
	5172	GUGCCAAG	CUGAUGA	X	GAA	AGCAUAAA	UUUAUGCUC	CUUGGCAC
	5175	GCUGUGCC	CUGAUGA	X	GAA	AGGAGCAU	AUGCUCUUU	GGCACAGC
	5195	GCAUAAAU	CUGAUGA	X	GAA	ACACAUCA	UGAUGUGUA	AUUUAUGC
10	5198	CUUGCAUA	CUGAUGA	X	GAA	AUUACACA	UGUGUAAUU	UAUGCAAG
	5199	GCUUGCAU	CUGAUGA	X	GAA	AAUUACAC	GUGUAAUUU	AUGCAAGC
	5200	AGCUUGCA	CUGAUGA	X	GAA	AAAUUACA	UGUAAUUUA	UGCAAGCU
	5209	UGGAGAGG	CUGAUGA	X	GAA	AGCUUGCA	UGCAAGCUC	CCUCUCCA
	5213	UAGCUGGA	CUGAUGA	X	GAA	AGGGAGCU	AGCUCUCCU	UCCAGCUA
15	5215	CCUAGCUG	CUGAUGA	X	GAA	AGAGGGAG	CUCCUCUCU	CAGCUAGG
	5221	CUGAGUCC	CUGAUGA	X	GAA	AGCUGGAG	CUCCAGCUA	GGACUCAG
	5227	AAUAUCCU	CUGAUGA	X	GAA	AGUCCUAG	CUAGGACUC	AGGAUAAU
	5233	UUGACUAA	CUGAUGA	X	GAA	AUCCUGAG	CUCAGGAUA	UUAGUCAA
	5235	CAUUGACU	CUGAUGA	X	GAA	AUAUCCUG	CAGGAUAAU	AGUCAAAU
20	5236	UCAUUGAC	CUGAUGA	X	GAA	AAUAUCCU	AGGAUAAUA	GUCAAUGA
	5239	GGCUCAUU	CUGAUGA	X	GAA	ACUAAUUA	AUAUUAGUC	AAUGAGCC
	5250	UUCCUUUU	CUGAUGA	X	GAA	AUGGCUCA	UGAGCCAUC	AAAAGGAA
	5273	AAAUAGA	CUGAUGA	X	GAA	AGGUUUUU	AAAAACCUA	UCUUUUUU
	5275	GAAAAUAA	CUGAUGA	X	GAA	AUAGGUUU	AAACCUAUC	UUUUUUUC
25	5277	AUGAAAAU	CUGAUGA	X	GAA	AGAUAGGU	ACCUAUCUU	AUUUUCAU
	5278	GAUGAAAA	CUGAUGA	X	GAA	AAGAUAGG	CCUAUCUUA	UUUUUCAUC
	5280	CAGAUGAA	CUGAUGA	X	GAA	AUAAGAU	UAUCUUAAU	UUCAUCUG
	5281	ACAGAUGA	CUGAUGA	X	GAA	AAUAAGAU	AUCUUUUUU	UCAUCUGU
	5282	AACAGAUG	CUGAUGA	X	GAA	AAUAAGA	UCUUUUUUU	CAUCUGUU
30	5283	AAACAGAU	CUGAUGA	X	GAA	AAAAUAAG	CUUUUUUUC	AUCUGUUU
	5286	AUGAAACA	CUGAUGA	X	GAA	AUGAAAAU	AUUUUCAUC	UGUUUCAU
	5290	AGGUUAUG	CUGAUGA	X	GAA	ACAGAUGA	UCAUCUGUU	UCAUACCU
	5291	AAGGUUAUG	CUGAUGA	X	GAA	AACAGAUG	CAUCUGUUU	CAUACCUU

5292	CAAGGUUAU CUGAUGA X GAA AAACAGAU	AUCUGUUUC AUACCUUG
5295	AGACAAGG CUGAUGA X GAA AUGAAACA	UGUUUCAUA CCUUGUCU
5299	CCCCAGAC CUGAUGA X GAA AGGUAUGA	UCAUACCUU GUCUGGGG
5302	AGACCCCA CUGAUGA X GAA ACAAGGUA	UACCUUGUC UGGGGUCU
5 5309	CGUCAUUA CUGAUGA X GAA ACCCCAGA	UCUGGGGUC UAAUGACG
5311	AUCGUCAU CUGAUGA X GAA AGACCCCA	UGGGGUCUA AUGACGAU
5331	CCCAUGUC CUGAUGA X GAA ACCCUGUU	AACAGGGUA GACAUGGG
5350	CCCUUUUC CUGAUGA X GAA ACCCUGUC	GACAGGGUA GAAAAGGG
5367	ACCCCAA CUGAUGA X GAA AGCGGGCA	UGCCCGCUC UUUGGGGU
10 5369	AGACCCCA CUGAUGA X GAA AGAGCGGG	CCCGCUCUU UGGGGUCU
5370	UAGACCCC CUGAUGA X GAA AAGAGCGG	CCGCUCUUU GGGGUCUA
5376	CAUCUCUA CUGAUGA X GAA ACCCCAAA	UUUGGGGUC UAGAGAUG
5378	CUCAUCUC CUGAUGA X GAA AGACCCCA	UGGGGUCUA GAGAUGAG
5395	AUUUUAGA CUGAUGA X GAA ACCCAGGG	CCCUGGGUC UCUAAAAU
15 5397	CCAUUUUA CUGAUGA X GAA AGACCCAG	CUGGGUCUC UAAAAUGG
5399	AGCCAUUU CUGAUGA X GAA AGAGACCC	GGGUCUCUA AAAUGGCU
5408	UUCUAAGA CUGAUGA X GAA AGCCAUUU	AAAUGGCUC UCUUAGAA
5410	ACUUCUAA CUGAUGA X GAA AGAGCCAU	AUGGCUCUC UUAGAAGU
5412	CAACUUCU CUGAUGA X GAA AGAGAGCC	GGCUCUCUU AGAAGUUG
20 5413	ACAACUUC CUGAUGA X GAA AAGAGAGC	GCUCUCUUA GAAGUUGU
5419	GCACAUAC CUGAUGA X GAA ACUUCUAA	UUAGAAGUU GUAUGUGC
5422	UUUGCACA CUGAUGA X GAA ACAACUUC	GAAGUUGUA UGUGCAAA
5432	CAGACCAU CUGAUGA X GAA AUUUGCAC	GUGCAAAUU AUGGUCUG
5433	ACAGACCA CUGAUGA X GAA AAUUGCA	UGCAAAUUA UGGUCUGU
25 5438	AGCACACA CUGAUGA X GAA ACCAUAAU	AUUAUGGUC UGUGUGCU
5447	CACGACCU CUGAUGA X GAA AGCACACA	UGUGUGCUU AGGUCGUG
5448	GCACGACC CUGAUGA X GAA AAGCACAC	GUGUGCUUA GGUCGUGC
5452	GUGUGCAC CUGAUGA X GAA ACCUAAGC	GCUUAGGUC GUGCACAC
5475	CCAGCUGU CUGAUGA X GAA ACCGGCUC	GAGCCGGUC ACAGCUGG
30 5497	AAAGCAGC CUGAUGA X GAA AUUCAUCG	CGAUGAAUA GCUCGUUU
5504	CUCUCCCA CUGAUGA X GAA AGCAGCUA	UAGCUGCUU UGGGAGAG
5505	GCUCUCCC CUGAUGA X GAA AAGCAGCU	AGCUGCUUU GGGAGAGC
5524	UAAGUGGC CUGAUGA X GAA AGCAUGCU	AGCAUGCUA GCCACUUA

	5531	AGAGAAUU	CUGAUGA	X	GAA	AGUGGCUA	UAGCCACUU	AAUUCUCU
	5532	CAGAGAAU	CUGAUGA	X	GAA	AAGUGGCU	AGCCACUUA	AUUCUCUG
	5535	GGUCAGAG	CUGAUGA	X	GAA	AUUAAGUG	CACUUAUU	CUCUGACC
	5536	CGGUCAGA	CUGAUGA	X	GAA	AAUUAAGU	ACUUAUUUC	UCUGACCG
5	5538	CCCGGUCA	CUGAUGA	X	GAA	AGAAUUAA	UUAAUUCUC	UGACCGGG
	5554	GUACCCAU	CUGAUGA	X	GAA	AUGCUGGC	GCCAGCAUC	AUGGGUAC
	5561	GGAGCAGG	CUGAUGA	X	GAA	ACCCAUGA	UCAUGGGUA	CCUGCUCC
	5568	ACACAGGG	CUGAUGA	X	GAA	AGCAGGUA	UACCUGCUC	CCCUGUGU
	5577	GGAUGGGG	CUGAUGA	X	GAA	ACACAGGG	CCCUGUGUA	CCCCAUCC
10	5584	ACCUAAG	CUGAUGA	X	GAA	AUGGGGUA	UACCCCAUC	CUUAAGGU
	5587	AAAACCUU	CUGAUGA	X	GAA	AGGAUGGG	CCCAUCCUU	AAGGUUUU
	5588	GAAAACCU	CUGAUGA	X	GAA	AAGGAUGG	CCAUCCUUA	AGGUUUUC
	5593	AGACAGAA	CUGAUGA	X	GAA	ACCUAAG	CUUAAGGUU	UUCUGUCU
	5594	CAGACAGA	CUGAUGA	X	GAA	AACCUUAA	UUAAGGUU	UCUGUCUG
15	5595	UCAGACAG	CUGAUGA	X	GAA	AAACCUUA	UAAGGUUUU	CUGUCUGA
	5596	AUCAGACA	CUGAUGA	X	GAA	AAAACCUU	AAGGUUUUC	UGUCUGAU
	5600	UCUCAUCA	CUGAUGA	X	GAA	ACAGAAAA	UUUUCUGUC	UGAUGAGA
	5627	UCAGUGGG	CUGAUGA	X	GAA	AUUGCACU	AGUGCAAUC	CCCACUGA
	5660	UGCACCAA	CUGAUGA	X	GAA	AGCCACAG	CUGUGGCUC	UUGGUGCA
20	5662	AGUGCACC	CUGAUGA	X	GAA	AGAGCCAC	GUGGCUCUU	GGUGCACU
	5671	UGGCUGGU	CUGAUGA	X	GAA	AGUGCACC	GGUGCACUC	ACCAGCCA
	5685	UACUUGUC	CUGAUGA	X	GAA	AGUCCUGG	CCAGGACUA	GACAAGUA
	5693	CCCUUUC	CUGAUGA	X	GAA	ACUUGUCU	AGACAAGUA	GGAAAGGG
	5704	GUGGCUAG	CUGAUGA	X	GAA	AGCCCUUU	AAAGGGCUU	CUAGCCAC
25	5705	UGUGGCUA	CUGAUGA	X	GAA	AAGCCCUU	AAGGGCUUC	UAGCCACA
	5707	AGUGUGGC	CUGAUGA	X	GAA	AGAAGCCC	GGGCUUCUA	GCCACACU
	5731	CCCUACCU	CUGAUGA	X	GAA	AUUUUCUU	AAGAAAAUC	AGGUAGGG
	5736	GCCAGCCC	CUGAUGA	X	GAA	ACCUGAUU	AAUCAGGUA	GGGUGGGC
	5754	UGGACAAA	CUGAUGA	X	GAA	AUGUCUUU	AAAGACAUC	UUUGUCCA
30	5756	AAUGGACA	CUGAUGA	X	GAA	AGAUGUCU	AGACAUCUU	UGUCCAUU
	5757	GAAUGGAC	CUGAUGA	X	GAA	AAGAUUC	GACAUCUUU	GUCCAUUC
	5760	UGCGAAG	CUGAUGA	X	GAA	ACAAAGAU	AUCUUUGUC	CAUUCGCA
	5764	CUUUUGCG	CUGAUGA	X	GAA	AUGGACAA	UUGUCCAUU	CGCAAAAG

	5765	GCUUUUGC CUGAUGA X GAA AAUGGACA	UGUCCAUUC GCAAAAGC
	5775	GCCGACAA CUGAUGA X GAA AGCUUUUG	CAAAAGCUC UUGUCGGC
	5777	CAGCCGAC CUGAUGA X GAA AGAGCUUU	AAAGCUCUU GUCGGCUG
	5780	CUGCAGCC CUGAUGA X GAA ACAAGAGC	GCUCUUGUC GGCUCGAG
5	5794	GCCUGACU CUGAUGA X GAA ACACACUG	CAGUGUGUA AGUCAGGC
	5798	CAUCGCCU CUGAUGA X GAA ACUUACAC	GUGUAAGUC AGGCGAUG
	5818	UUCUCUGG CUGAUGA X GAA AGCCUCUG	CAGAGGCUA CCAGAGAA
	5852	GGAUGAGA CUGAUGA X GAA ACCUCAGG	CCUGAGGUU UCUCAUCC
	5853	UGGAUGAG CUGAUGA X GAA AACCUCAG	CUGAGGUUU CUCAUCCA
10	5854	CUGGAUGA CUGAUGA X GAA AAACCUCA	UGAGGUUUC UCAUCCAG
	5856	AUCUGGAU CUGAUGA X GAA AGAAACCU	AGGUUUCUC AUCCAGAU
	5859	GAUAUCUG CUGAUGA X GAA AUGAGAAA	UUUCUCAUC CAGUAUUC
	5865	UUGCUGGA CUGAUGA X GAA AUCUGGAU	AUCCAGAUU UCCAGCAA
	5867	AAUUGCUG CUGAUGA X GAA AUUUCUGG	CCAGUAUUC CAGCAAUU
15	5875	CACCCCCC CUGAUGA X GAA AUUGCUGG	CCAGCAAUU GGGGGGUG
	5896	GGACCAUC CUGAUGA X GAA AUGGUCUU	AAGACCAUA GAUGGUCC
	5903	UAAUACAG CUGAUGA X GAA ACCAUCUA	UAGAUGGUC CUGUAUUA
	5908	CGGAAUAA CUGAUGA X GAA ACAGGACC	GGUCCUGUA UUAUCCG
	5910	AUCGGAAU CUGAUGA X GAA AUACAGGA	UCCUGUAUU AUUCCGAU
20	5911	AAUCGGAA CUGAUGA X GAA AAUACAGG	CCUGUAUUA UUCCGAUU
	5913	AAAUCGG CUGAUGA X GAA AUAAUACA	UGUAUUAUU CCGAUUUU
	5914	UAAAUCG CUGAUGA X GAA AAUAUAC	GUAUUAUUC CGAUUUUA
	5919	AUUAUUA CUGAUGA X GAA AUCGGAAU	AUUCCGAUU UUAUAUAA
	5920	GAUUAUUA CUGAUGA X GAA AAUCGGAA	UUCCGAUUU UAAUAUUC
25	5921	AGAUUAUU CUGAUGA X GAA AAAUCGGA	UCCGAUUUU AAUAUUCU
	5922	UAGAUUAU CUGAUGA X GAA AAAAUCGG	CCGAUUUUA AUAAUUCU
	5925	AAUUAAGU CUGAUGA X GAA AUUAAAAU	AUUUUAUAU AUCUAAUU
	5928	ACGAAUUA CUGAUGA X GAA AUUAUUA	UUAUAUAUC UAAUUCGU
	5930	UCACGAAU CUGAUGA X GAA AGAUUAUU	AAUAUUCU AUUCGUGA
30	5933	UGAUCACG CUGAUGA X GAA AUUAGAUU	AAUCUAAUU CGUGAUCU
	5934	AUGAUCAC CUGAUGA X GAA AAUUAAGU	AUCUAAUUC GUGAUCAU
	5940	CUCUUAU CUGAUGA X GAA AUCACGAA	UUCGUGAUC AUUAAGAG
	5943	AGUCUCUU CUGAUGA X GAA AUGAUCAC	GUGAUCAUU AAGAGACU

	5944	AAGUCUCU	CUGAUGA	X	GAA	AAUGAUC	UGAUCAUUA	AGAGACUU
	5952	AUUUACUA	CUGAUGA	X	GAA	AGUCUCUU	AAGAGACUU	UAGUAAAU
	5953	CAUUUACU	CUGAUGA	X	GAA	AAGUCUCU	AGAGACUUU	AGUAAAUG
	5954	ACAUUUAC	CUGAUGA	X	GAA	AAAGUCUC	GAGACUUUA	GUAAAUGU
5	5957	GGGACAUU	CUGAUGA	X	GAA	ACUAAAGU	ACUUUAGUA	AAUGUCCC
	5963	GGAAAAGG	CUGAUGA	X	GAA	ACAUUUAC	GUAAAUGUC	CCUUUCC
	5967	UGUGGGAA	CUGAUGA	X	GAA	AGGGACAU	AUGUCCCUU	UUCCACAA
	5968	UUGUGGGA	CUGAUGA	X	GAA	AAGGGACA	UGUCCCUUU	UCCACAAA
	5969	UUUGUGGG	CUGAUGA	X	GAA	AAAGGGAC	GUCCCUUUU	CCCACAAA
10	5970	UUUUGUGG	CUGAUGA	X	GAA	AAAAGGGA	UCCCUUUUC	CCACAAAA
	5981	CUUUUCUU	CUGAUGA	X	GAA	ACUUUUGU	ACAAAAGUA	AAGAAAAG
	5992	AAUCCCGA	CUGAUGA	X	GAA	AGCUUUUC	GAAAAGCUA	UCGGGAUU
	5994	AGAAUCCC	CUGAUGA	X	GAA	AUAGCUUU	AAAGCUAUC	GGGAUUCU
	6000	AACCAGAG	CUGAUGA	X	GAA	AUCCCGAU	AUCGGGAUU	CUCUGGUU
15	6001	GAACCAGA	CUGAUGA	X	GAA	AAUCCCGA	UCGGGAUUC	UCUGGUUC
	6003	CAGAACCA	CUGAUGA	X	GAA	AGAAUCCC	GGGAUUCUC	UGGUUCUG
	6008	UUAAGCAG	CUGAUGA	X	GAA	ACCAGAGA	UCUCUGGUU	CUGCUUAA
	6009	UUUAAGCA	CUGAUGA	X	GAA	AACCAGAG	CUCUGGUUC	UGCUUAAA
	6014	AAGUCUUU	CUGAUGA	X	GAA	AGCAGAAC	GUUCUGCUU	AAAGACUU
20	6015	UAAGUCUU	CUGAUGA	X	GAA	AAGCAGAA	UUCUGCUUA	AAGACUUA
	6022	CCAAAGCU	CUGAUGA	X	GAA	AGUCUUUA	UAAAGACUU	AGCUUUGG
	6023	UCCAAAGC	CUGAUGA	X	GAA	AAGUCUUU	AAAGACUUA	GCUUUGGA
	6027	AGGCUCCA	CUGAUGA	X	GAA	AGCUAAGU	ACUAGCUU	UGGAGCCU
	6028	UAGGCUCC	CUGAUGA	X	GAA	AAGCUAAG	CUUAGCUUU	GGAGCCUA
25	6036	AACUUUCA	CUGAUGA	X	GAA	AGGCUCCA	UGGAGCCUA	UGAAAGUU
	6044	GGCUGAUC	CUGAUGA	X	GAA	ACUUUCAU	AUGAAAGUU	GAUCAGCC

Where "X" represents stem II region of a HH ribozyme (Hertel et al., 1992 *Nucleic Acids Res.* 20 3252). The length of stem II may be ≥ 2 base-pairs.

184

Table IX: Mouse *flt1* VEGF Receptor-Hairpin Ribozyme and Substrate Sequence

nt. Position		HP Ribozyme Sequence		Substrate	
5	33	GUCCCAGC	AGAA GACCAU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	AUGGUCA	GCU GCUGGGAC
	36	GGUGUCCC	AGAA GCUGAC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	GUCAGCU	GCU GGGACACC
	50	UAAGGCAA	AGAA GCGGUG ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	CACCGCG	GUC UUGCCUUA
	67	GACACCCG	AGAA GCGCGU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	ACGCGCU	GCU CGGGUGUC
	79	CUGUGAGA	AGAA GACACC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	GGUGUCU	GCU UCUCACAG
10	166	GAAGAGA	AGAA GGCCUG ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	CAGGCCA	GAC UCUCUUUC
	197	CAUGAGUG	AGAA GCCUCC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	GGAGGCA	GCC CACUCAUG
	214	CGGUCGUG	AGAA GAGACC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	GGUCUCU	GCC CACGACCG
	266	CUCCCACA	AGAA GAUGGG ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	CCCAUCG	GCC UGUGGGAG
	487	GGAUGAUG	AGAA GUCUUC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	GAAGACA	GCU CAUCAUCC
15	501	CGUCACCC	AGAA GGGGAU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	AUCCCCU	GCC GGGUGACG
	566	CUUUGCCC	AGAA GGGGUA ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	UACCCCU	GAU GGGCAAAG
	640	CGCAGUUC	AGAA GUCCUA ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	UAGGACU	GCU GAACUGCG
	691	GCCGAUGG	AGAA GAUAGU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	ACUAUCU	GAC CCAUCGGC
	703	UUGUAUUG	AGAA GCCGAU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	AUCGGCA	GAC CAAUACAA

184

185

736	CUGGGCUC	AGAA	GGCGUA	ACCAGAGAAACACACG	UUUGUGGUA	CAUUA	ACCUGGUA	UACGCC	GCC	GAGCCCAG
754	GCCCGUGG	AGAA	GUCUCA	ACCAGAGAAACACACG	UUUGUGGUA	CAUUA	ACCUGGUA	UGAGACU	GCU	CCACGGGC
766	GGACAAGA	AGAA	GCCCGU	ACCAGAGAAACACACG	UUUGUGGUA	CAUUA	ACCUGGUA	ACGGGCA	GAC	UCUUGUCC
871	UCCGGUCA	AGAA	GCUGCC	ACCAGAGAAACACACG	UUUGUGGUA	CAUUA	ACCUGGUA	GGCAGCG	GAU	UGACCGGA
5	CUUCACGC	AGAA	GGUGUA	ACCAGAGAAACACACG	UUUGUGGUA	CAUUA	ACCUGGUA	UACACCU	GUC	GGUGAAG
988	UGUUGAAA	AGAA	GGAACG	ACCAGAGAAACACACG	UUUGUGGUA	CAUUA	ACCUGGUA	CGUUGCA	GUC	UUUCAACA
1051	CCUGCAC	AGAA	GCUUCC	ACCAGAGAAACACACG	UUUGUGGUA	CAUUA	ACCUGGUA	GGAAGCA	GCC	GGUGCAGG
1081	GCCGAUAG	AGAA	GUCUUC	ACCAGAGAAACACACG	UUUGUGGUA	CAUUA	ACCUGGUA	GAAGACG	GUC	CUAUCGGC
1090	UCAUGGAC	AGAA	GAUAGG	ACCAGAGAAACACACG	UUUGUGGUA	CAUUA	ACCUGGUA	CCUAUCG	GCU	GUCCAUGA
10	CUUUC AUG	AGAA	GCCGAU	ACCAGAGAAACACACG	UUUGUGGUA	CAUUA	ACCUGGUA	AUCGGCU	GUC	CAUGAAAG
1169	AAAUAGCG	AGAA	GACUUC	ACCAGAGAAACACACG	UUUGUGGUA	CAUUA	ACCUGGUA	GAAGUCU	GCU	CGCUAUUU
1315	UUUCGUAG	AGAA	GAGGUU	ACCAGAGAAACACACG	UUUGUGGUA	CAUUA	ACCUGGUA	AACCUCA	GAU	CUACGAAA
1363	UGCUGCCC	AGAA	GAUAGA	ACCAGAGAAACACACG	UUUGUGGUA	CAUUA	ACCUGGUA	UCUAUCC	GCU	GGGCAGCA
1604	GUCUGAGA	AGAA	GCCACC	ACCAGAGAAACACACG	UUUGUGGUA	CAUUA	ACCUGGUA	GGUGGCU	GAC	UCUCAGAC
15	UUCCAGGG	AGAA	GAGAGU	ACCAGAGAAACACACG	UUUGUGGUA	CAUUA	ACCUGGUA	ACUCUCA	GAC	CCCUGGAA
1629	GGCCCGGC	AGAA	GUAGAU	ACCAGAGAAACACACG	UUUGUGGUA	CAUUA	ACCUGGUA	AUCUACA	GCU	GCCGGGCC
1632	GAAGGCC	AGAA	GCUGUA	ACCAGAGAAACACACG	UUUGUGGUA	CAUUA	ACCUGGUA	UACAGCU	GCC	GGCCCUUC
1688	UUCGGCAC	AGAA	GUGACA	ACCAGAGAAACACACG	UUUGUGGUA	CAUUA	ACCUGGUA	UGUCACA	GAU	GUGCCGAA
1730	UCUCCUUC	AGAA	GGCAUC	ACCAGAGAAACACACG	UUUGUGGUA	CAUUA	ACCUGGUA	GAUGCCA	GCC	GAAGGAGA

185

186

1753	CCACACAG AGAA GUUUC	ACCAGAGAAAACACACG	UUGUGGUACA	UUUACCUGGUA	UGAAACU GUC	CUGUGUGG
2017	GGUUUUGA AGAA GGUGUG	ACCAGAGAAAACACACG	UUGUGGUACA	UUUACCUGGUA	CACACCU GCU	UCAAAAACC
2101	ACCAAGUG AGAA GAGGCG	ACCAGAGAAAACACACG	UUGUGGUACA	UUUACCUGGUA	CGCCUCA GAU	CACUUGGU
2176	UUUCAUAU AGAA GCGUGC	ACCAGAGAAAACACACG	UUGUGGUACA	UUUACCUGGUA	GCACGCU GUU	UAUUGAAA
5 2258	GUGAGGUA AGAA GCGCUU	ACCAGAGAAAACACACG	UUGUGGUACA	UUUACCUGGUA	AAGCGCA GCC	UACCUCAC
2305	UGAGCGUG AGAA GCUCCA	ACCAGAGAAAACACACG	UUGUGGUACA	UUUACCUGGUA	UGGAGCU GAU	CACGCUCA
2383	CGGAAGAA AGAA GCUUCA	ACCAGAGAAAACACACG	UUGUGGUACA	UUUACCUGGUA	UGAAAGC GUC	UUCUUCGG
2405	GACAGGUA AGAA GUCUUU	ACCAGAGAAAACACACG	UUGUGGUACA	UUUACCUGGUA	AAAGACA GAC	UACCUGUC
2432	GGAAUUC AGAA GGGUCC	ACCAGAGAAAACACACG	UUGUGGUACA	UUUACCUGGUA	GGACCCA GAU	GAAGUUC
10 2464	CAUAGGGC AGAA GUUCAC	ACCAGAGAAAACACACG	UUGUGGUACA	UUUACCUGGUA	GUGAACG GCU	GCCCUAUG
2467	CAUCAUAG AGAA GCCGUU	ACCAGAGAAAACACACG	UUGUGGUACA	UUUACCUGGUA	AACGGCU GCC	CUAUGAUG
2592	CACAGUCC AGAA GGUGGG	ACCAGAGAAAACACACG	UUGUGGUACA	UUUACCUGGUA	CCCACCU GCC	GGACUGUG
2596	CAGCCACA AGAA GGCAGG	ACCAGAGAAAACACACG	UUGUGGUACA	UUUACCUGGUA	CCUGCCG GAC	UGUGGCUG
2653	GUUCGGUC AGAA GAGCUU	ACCAGAGAAAACACACG	UUGUGGUACA	UUUACCUGGUA	AAGCUCU GAU	GACCGAAC
15 2743	CGAUCACC AGAA GAGGCC	ACCAGAGAAAACACACG	UUGUGGUACA	UUUACCUGGUA	GGCCUCU GAU	GGUGAUCG
2779	GGUAGUUG AGAA GGUUUC	ACCAGAGAAAACACACG	UUGUGGUACA	UUUACCUGGUA	GAAACCU GUC	CAACUACC
2814	CUUGUUGA AGAA GAAUAA	ACCAGAGAAAACACACG	UUGUGGUACA	UUUACCUGGUA	UUUUCU GUC	UCAACAAG
2831	AUAUGCAA AGAA GCGUCC	ACCAGAGAAAACACACG	UUGUGGUACA	UUUACCUGGUA	GGACGCA GCC	UUGCAUUA
2895	ACUGUCUA AGAA GGGCUU	ACCAGAGAAAACACACG	UUGUGGUACA	UUUACCUGGUA	AAGCCCC GCC	UAGACAGU

186

187

2913	GACACUUG AGAA GCUGAC ACCAGAGAAACACACGUTUGUGGUACAUAUACCUGGUA	GUCAGCA GCU CAAGUGUC
2928	GAAGCUGG AGAA GGUGAC ACCAGAGAAACACACGUTUGUGGUACAUAUACCUGGUA	GUCACCA GCU CCAGCUUC
2934	UUCAGGGA AGAA GGAGCU ACCAGAGAAACACACGUTUGUGGUACAUAUACCUGGUA	AGCUCCA GCU UCCCUGAA
3001	UGGUGAGG AGAA GCUUGG ACCAGAGAAACACACGUTUGUGGUACAUAUACCUGGUA	CCAAGCA GCC CCUCACCA
5 3022	UGUAGGAA AGAA GGUCUU ACCAGAGAAACACACGUTUGUGGUACAUAUACCUGGUA	AAGACCU GAU UUCCUACA
3033	CACUUGGA AGAA GUAGGA ACCAGAGAAACACACGUTUGUGGUACAUAUACCUGGUA	UCCUACA GUU UCCAAAGUG
3064	UUCUGGAG AGAA GAAACU ACCAGAGAAACACACGUTUGUGGUACAUAUACCUGGUA	AGUUUCU GUC CUCCAGAA
3179	CUCACAUU AGAA GGGUUC ACCAGAGAAACACACGUTUGUGGUACAUAUACCUGGUA	GAACCCU GAU UAUUGUGAG
3357	CUUCAGGC AGAA GCAGAA ACCAGAGAAACACACGUTUGUGGUACAUAUACCUGGUA	UUCUGCA GCC GCCUGAAG
10 3360	UUCCUUCU AGAA GCUUGA ACCAGAGAAACACACGUTUGUGGUACAUAUACCUGGUA	UGCAGCC GCC UGAAAGGAA
3379	GGGUUCUC AGAA GCAUGC ACCAGAGAAACACACGUTUGUGGUACAUAUACCUGGUA	GCAUGCG GAU GAGAACCC
3463	GUUCAGCA AGAA GGGGCC ACCAGAGAAACACACGUTUGUGGUACAUAUACCUGGUA	GGCCCCG GUU UGCUGAAC
3496	UGGCUUGA AGAA GGUCAC ACCAGAGAAACACACGUTUGUGGUACAUAUACCUGGUA	GUGACCU GCU UCAAGCCA
3553	UGUUUCUA AGAA GUAUGG ACCAGAGAAACACACGUTUGUGGUACAUAUACCUGGUA	CCAUACU GAC UAGAAACA
15 3615	AUCUGCAA AGAA GUCCUU ACCAGAGAAACACACGUTUGUGGUACAUAUACCUGGUA	AAGGACG GCU UUGCAGAU
3623	AAUUGUGG AGAA GCAAAG ACCAGAGAAACACACGUTUGUGGUACAUAUACCUGGUA	CUUUGCA GAU CCACAUIU
3650	CUCACAUC AGAA GAGCUU ACCAGAGAAACACACGUTUGUGGUACAUAUACCUGGUA	AAGCUCU GAU GAUGUGAG
3754	UAGUGUCC AGAA GAUAGU ACCAGAGAAACACACGUTUGUGGUACAUAUACCUGGUA	ACUAUCA GCU GGACACUA
3772	GGGAGCCC AGAA GAGUGC ACCAGAGAAACACACGUTUGUGGUACAUAUACCUGGUA	GCACUCU GCU GGGCUCUCC

187

188

3796 UCCAGGUG AGAA GCUUCA ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA UGAAGCG GUU CACCUGGA
 3881 CUCGGCAG AGAA GAAAGU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA ACUUUCC GAU CUGCCGAG
 3886 UGGGCCUC AGAA GAUCGG ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA CCGAUCU GCC GAGGCCCA
 3897 GAAGCAGA AGAA GGGCCU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA AGGCCCA GCU UCUGCUUC
 5 3903 GCUGGAGA AGAA GAAGCU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA AGCUUCU GCU UCUCACG
 3912 GUGGCCAC AGAA GGAGAA ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA UUCUCCA GCU GUGGCCAC
 3969 UGGAGAAC AGAA GGACUC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA GAGUCCU GCU GUUCUCCA
 3972 GGGUGGAG AGAA GCAGGA ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA UCCUGCU GUU CUCCACCC
 3986 GAGUUGUA AGAA GGGGGU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA ACCCCCA GAC UACAACUC
 10 4018 UUUAGGCG AGAA GGGAGG ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA CCUCCCC GCC CGCCUAAA
 4022 AAGCUUUA AGAA GCGGGG ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA CCGCCCC GCC UAAAGCUU
 4040 GUUGUCGG AGAA GGUGAG ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA CUCACCA GCC CCGACAAC
 4053 CUGUCAGG AGAA GGUUGU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA ACAACCA GCC CCUGACAG
 4095 UCCUGUGG AGAA GAAUAG ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA CUAUUC GCU CCACAGGA
 15 4110 CGAAAAGC AGAA GGCUCU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA GGAGCCA GCU GCUUUUCG
 4113 UCACGAAA AGAA GCUGGC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA GCCAGCU GCU UUUUCGUA
 4168 UUAGUCAA AGAA GCAACA ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA UGUUGCU GUU UUGACUAA
 4290 GGUGGGCG AGAA GUCGCC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA GCGGACC GCC CGCCCAAC
 4294 GGCCGGUG AGAA GCGGGU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA ACCGCC GCC CACCGGCC

188

189

4329	AGUCCAC AGAA GCAGGG ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA	CCCUGCA GCU GUGGGACU
4378	CAGAGCAG AGAA GUGCAU ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA	AUGCACU GAC CUGCUCUG
4383	AGAGACAG AGAA GGUCAG ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA	CUGACCU GCU CUGCUCU
4388	AUAAGAGA AGAA GAGCAG ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA	CUGCUCU GUC UCUCUUAU
5 4457	CUCCACAG AGAA GACGCA ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA	UGCGUCC GUC CUGUGGAG
4525	CCCGAAC AGAA GAGGCC ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA	GGCCUCC GCU GUUUCGGG
4528	GGCCCCGA AGAA GCGGAG ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA	CUCCGCU GUU UCGGGCCC
4643	AAACAGAC AGAA GAAAGC ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA	GUCUUCU GUU GUCUGUUU
4650	GGAUGGUA AGAA GACAAC ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA	GUUGUCU GUU UACCAUCC
10 4724	ACUAGAGG AGAA GAUGAU ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA	AUCAUCA GUU CCUCUAGU
4771	AUGCGAAG AGAA GGCCUG ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA	CAGGCCU GAC CUUCGCAU
4785	UCCCCGUG AGAA GUAUGC ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA	GCAUACU GCU CACGGGGA
4809	CUAGGCCA AGAA GGACCA ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA	UGGUCCA GUU UGGCCUAG
4834	UTAGAGCC AGAA GUAGGC ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA	GCCUACU GAU GGGCUCAA
15 4912	AUAUAUAA AGAA GGAUAA ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA	UUAUCCU GUU UUAUAUUAU
5119	UCCUCUCA AGAA GCCUUG ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA	CAAGGCA GUC UGAGAGGA
5144	UAAUAUAG AGAA GAUACU ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA	AGUAUCA GCC CAUAUUAU
5267	AGGUAUGA AGAA GAUGAA ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA	UUAUCU GUU UCAUAUCCU
5363	CCCCAAAG AGAA GGCACC ACCAGAGAAACACACGUGUGGUAUUAUACCUGGUA	GGUGCCC GCU CUUUGGGG

189

190

5462	CCGGCUCC	AGAA	GGUGUG	ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	CACACCU	GCC	GGAGCCGG
5478	GUCUGCCC	AGAA	GUGACC	ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	GGUCACA	GCU	GGGCAGAC
5486	UAUJCAUC	AGAA	GCCCAG	ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	CUGGGCA	GAC	GAUGAAUA
5500	UCUCCCAA	AGAA	GUUAU	ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	AAUAGCU	GCU	UUUGGAGA
5539	CUGGCCCG	AGAA	GAGAAU	ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	AUUCUCU	GAC	CGGGCCAG
5564	CACAGGGG	AGAA	GGUACC	ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	GGUACCU	GCU	CCCCUGUG
5597	UCUCAUCA	AGAA	GAAAAC	ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	GUUUUCU	GUC	UGAUGAGA
5601	CCAGUCUC	AGAA	GACAGA	ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	UCUGUCU	GAU	GAGACUGG
5639	GGGCUGCA	AGAA	GUCUCA	ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	UGAGACA	GCC	UGCAGCCC
5646	CCACAGUG	AGAA	GCAGGC	ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	GCCUGCA	GCC	CACUGUGG
5781	CACACUGC	AGAA	GACAAG	ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	CUUGUCG	GCU	GCAGUGUG
5829	CUGUUCUC	AGAA	GUUUCU	ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	AGAAACG	GAU	GAGAACAG
5842	AAACCUCA	AGAA	GCUGUU	ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	AACAGCA	GCC	UGAGGUTU
5915	UUAUUAAA	AGAA	GAUUA	ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	UUUAUCC	GAU	UUUAAUAA
6010	AGUCUUUA	AGAA	GAACCA	ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	UGGUUCU	GCU	UAAAGACU

190

10

15

Table X: Homologous Hammerhead Ribozyme Target Sites
Between Human flt-1 and KDR RNA

	nt. Posi- tion	flt-1 Target Sequence		nt. Posi- tion	KDR Target Sequence
5	3388	CCGGGAU A UUUAUAA		3151	CCGGGAU A UUUAUAA
	2174	AAUGUAU A CACAGGG		3069	AgUGUAU c CACAGGG
	2990	UGCAAU A UGGAAAU		2756	UGCAAU u UGGAAAc
	2693	CUCCCUU A UGAUGCC		2459	CUgCCU A UGAUGCC
10	2981	GUUGAAU A CUGCAAA		2747	GUgGAAU u CUGCAAA
	1359	UAUGGUU A AAAGAUG		2097	UgUGGUU u AAAGAUa
	3390	GGGAUUAU U UAUAAGA		3153	GGGAUUAU U UAUAaag
	3391	GGAUAUU U AUAAGAA		3154	GGAUAUU U AUAaagA
	2925	ACGUGGU U AACCUGC		2691	AuGUGGU c AACCUuC
15	7140	UAUUUCU A GUCAUGA		2340	UAcUUCU u GUCAUcA
	1785	CAUAUUAU A GAAGGAA		1515	CucUAAU u GAAGGAA
	2731	GAGACUU A AACUGGG		768	uuGACUU c AACUGGG
	3974	GAUGACU A CCAGGGC		1466	GAgGACU u CCAGGGa
	6590	UUA AUGU A GAAAGAA		2603	aaAAUGU u GAAAGAA
20	6705	GCCAUUU A UGACAAA		3227	aCaAUUU u UGACaG
	974	GUCAAU U ACUUAGA		147	uUCAAAU U ACUUGcA
	1872	AUAAAGU U GGGACUG		1602	AcAAAGU c GGGAgA
	2333	ACUUGGU U UAAAAAC		1088	AaaUGGU a UAAAAAu
	2775	AAGUGGU U CAAGCAU		1745	AcaUGGU a CAAGCuU
25	3533	UUCUCCU U AGGUGGG		3296	UUuUCCU U AGGUGcu
	3534	UCUCCU A GGUGGU		3297	UuUCCU A GGUGcuU
	3625	GUACUCU A CUCCUGA		4054	GagCUCU c CUCCUGu
	1814	AGCACCU U GGUUGUG		1059	AGuACCU U GGUUacc
	2744	GGCAAU C ACUUGGA		147	uuCAAU u ACUUGcA
30	2783	CAAGCAU C AGCAUUU		796	gAAGCAU C AGCAUaa

192

	3613	GAGAGCU C CUGAGUA	2968	GgaAGCU C CUGAagA
	4052	AAGGCCU C GCUCAAG	1923	ucuGCCU u GCUCAAG
	5305	UCUCCAU A UCAAAAC	456	ggUCCAU u UCAAAuC
	7158	AUGUAUU U UGUUAUC	631	gUcUAUU a UGUAcAu
5	1836	CUAGAAU U UCUGGAA	1007	aUgGAAU c UCUGGug
	2565	CUCUCUU C UGGCUCC	2328	uguUCUU C UGGCUaC
	4250	CUGUACU C CACCCCA	3388	uUaUACU a CACCagA
	7124	ACAUGGU U UGGUCCU	3778	cagUGGU a UGGUuCU
	436	AUGGUCU U UGCCUGA	1337	AcGGUCU a UGCCauu
10	2234	GCACCAU A CCUCCUG	1344	augCCAU u CCUCCcc
	2763	GGGCUUU U GGAAAAG	990	uuGCUUU U GGAAguG
	4229	CCAGACU A CAACUCG	767	auuGACU u CAACUgG
	5301	GUUUUCU C CAUAUCA	3307	ugcUUCU C CAUAUCC
	6015	AGAAUGU A UGCCUCU	1917	AcuAUGU c UGCCUug
15	6095	AUUCCCU A GUGAGCC	1438	AUaCCCU u GUGAaga
	6236	UGUUGUU C CUCUUCU	76	UagUGUU u CUCUUGa
	5962	GCUUCCU U UUAUCCA	3099	auaUCCU c UUAUCgg
	7629	UAUAUAU U CUCUGCU	3096	gAaAUAU c CUCUuaU

Lowercase letters are used to represent sequence variance
 20 between flt-1 and KDR RNA

Table XI: 2.5 μ mol RNA Synthesis Cycle

Reagent	Equivalents	Amount	Wait Time*
Phosphoramidites	6.5	163 μ L	2.5
S-Ethyl Tetrazole	23.8	238 μ L	2.5
5 Acetic Anhydride	100	233 μ L	5 sec
N-Methyl Imidazole	186	233 μ L	5 sec
TCA	83.2	1.73 mL	21 sec
Iodine	8.0	1.18 mL	45 sec
Acetonitrile	NA	6.67 mL	NA

Claims

1. Nucleic acid molecule which modulates the synthesis, expression and/or stability of an mRNA encoding one or more receptors of vascular endothelial growth factor.
5
2. The nucleic acid of claim 1, wherein said receptor is flt-1, KDR and/or flk-1.
3. The nucleic acid of claim 1 or 2, wherein said molecule is an enzymatic nucleic acid molecule.
- 10 4. The nucleic acid molecule of claim 3, wherein, the binding arms of said enzymatic nucleic acid contain sequences complementary to the substrate nucleotide base sequences in any one of Tables II to IX.
- 15 5. The nucleic acid molecule of claims 3 or 4, wherein said nucleic acid molecule is in a hammerhead motif.
- 20 6. The enzymatic nucleic acid molecule of claim 3 or 4, wherein said nucleic acid molecule is in a hairpin, hepatitis Delta virus, group I intron, VS nucleic acid or RNaseP nucleic acid motif.
7. The enzymatic nucleic acid molecule of any of claims 3 or 4, wherein said ribozyme comprises between 12 and 100 bases complementary to the RNA of said region.
- 25 8. The enzymatic nucleic acid of claim 7, wherein said ribozyme comprises between 14 and 24 bases complementary to the RNA of said region.
9. Enzymatic nucleic acid molecule consisting essentially of any ribozyme sequence selected from those shown in Tables II to IX.

195

10. A mammalian cell including a nucleic acid molecule of any of claims 1, 2 or 3.

11. The cell of claim 10, wherein said cell is a human cell.

5 12. An expression vector comprising nucleic acid encoding the nucleic acid molecule of any of claims 1, 2, 3 or 4, in a manner which allows expression and/or delivery of that RNA molecule within a mammalian cell.

13. The expression vector of claim 12, wherein said
10 nucleic acid is an enzymatic nucleic acid.

14. A mammalian cell including an expression vector of any of claims 12 or 13.

15. The cell of claim 14, wherein said cell is a human cell.

15 16. A method for treatment of a patient having a condition associated with the level of flt-1, KDR and/or flk-1, wherein the patient, tissue donor or population of corresponding cells is administered a therapeutically effective amount of an enzymatic nucleic acid molecule of
20 claims 1, 2, 3 or 4.

17. A method for treatment of a condition related to the level of flt-1, KDR and/or flk-1 activity by administering to a patient an expression vector of claim 12.

18. The method of claims 16 or 17, wherein said
25 patient is a human.

19. The nucleic acid of claim 1 or 2, wherein said molecule is an antisense nucleic acid molecule.

20. The nucleic acid molecule of claim 19, wherein, said antisense nucleic acid contain sequences complementary to the substrate nucleotide base sequences in any one of Tables II to IX.

5 21. An expression vector comprising nucleic acid encoding the antisense nucleic acid molecule of any one of claims 19 or 20, in a manner which allows expression and/or delivery of that antisense RNA molecule within a mammalian cell.

10 22. A mammalian cell including an expression vector of claim 21.

23. The cell of claim 22, wherein said cell is a human cell.

FIG. 1.

FIG. 2a.

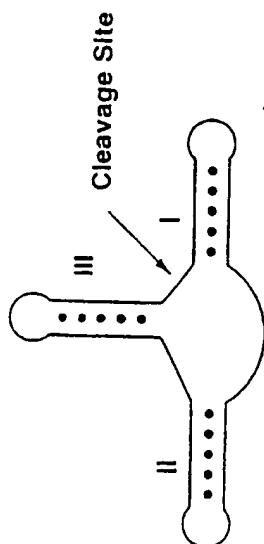


FIG. 2b.

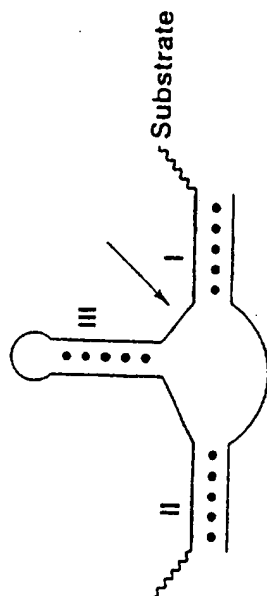


FIG. 2c.

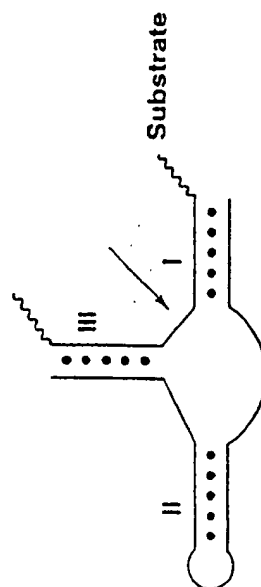


FIG. 2d.

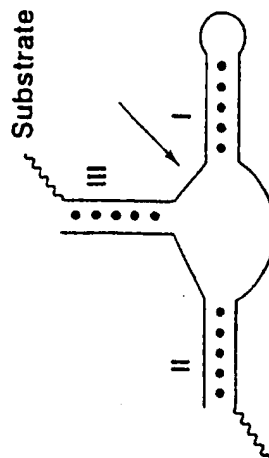


FIG. 3.

4/20



5/20

NEUROSPORA VS RNA ENZYME

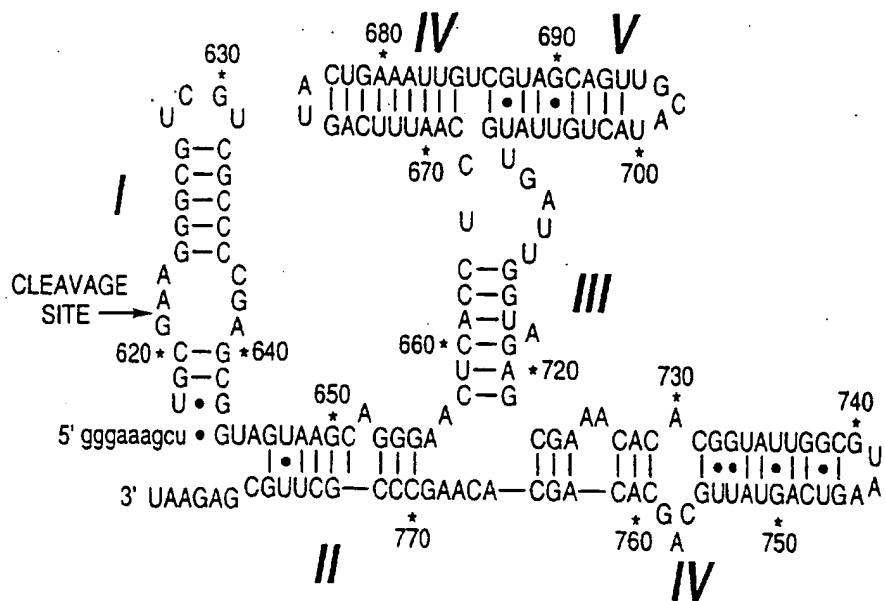
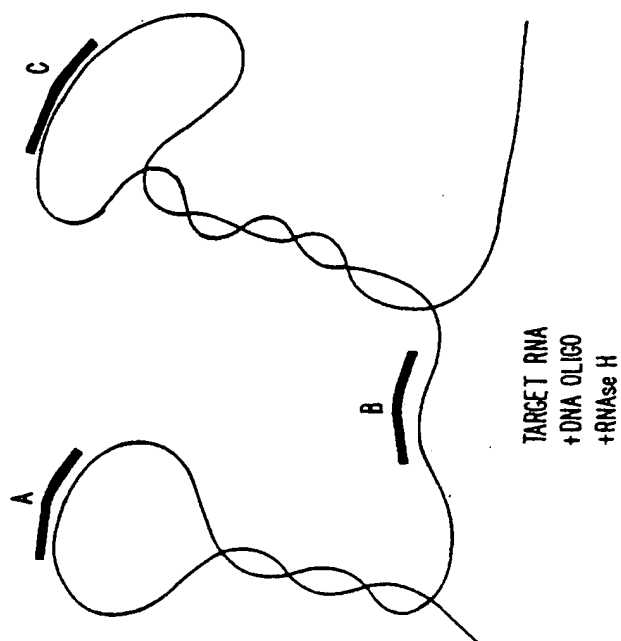
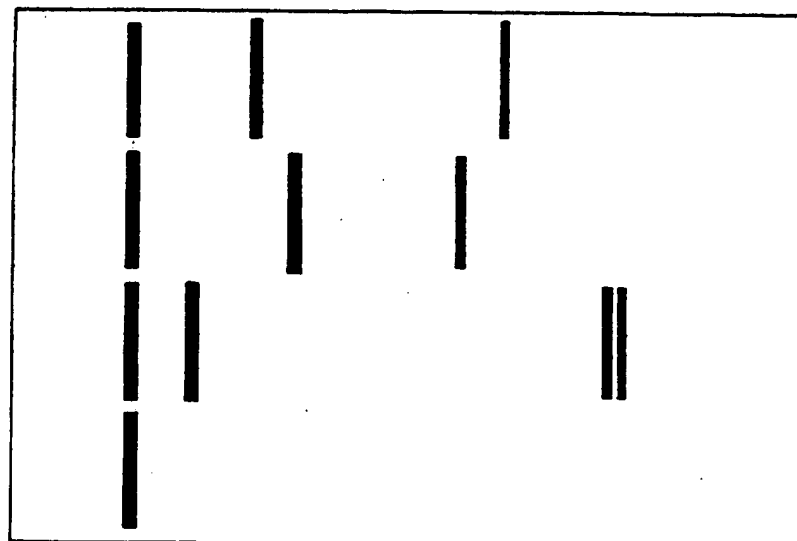


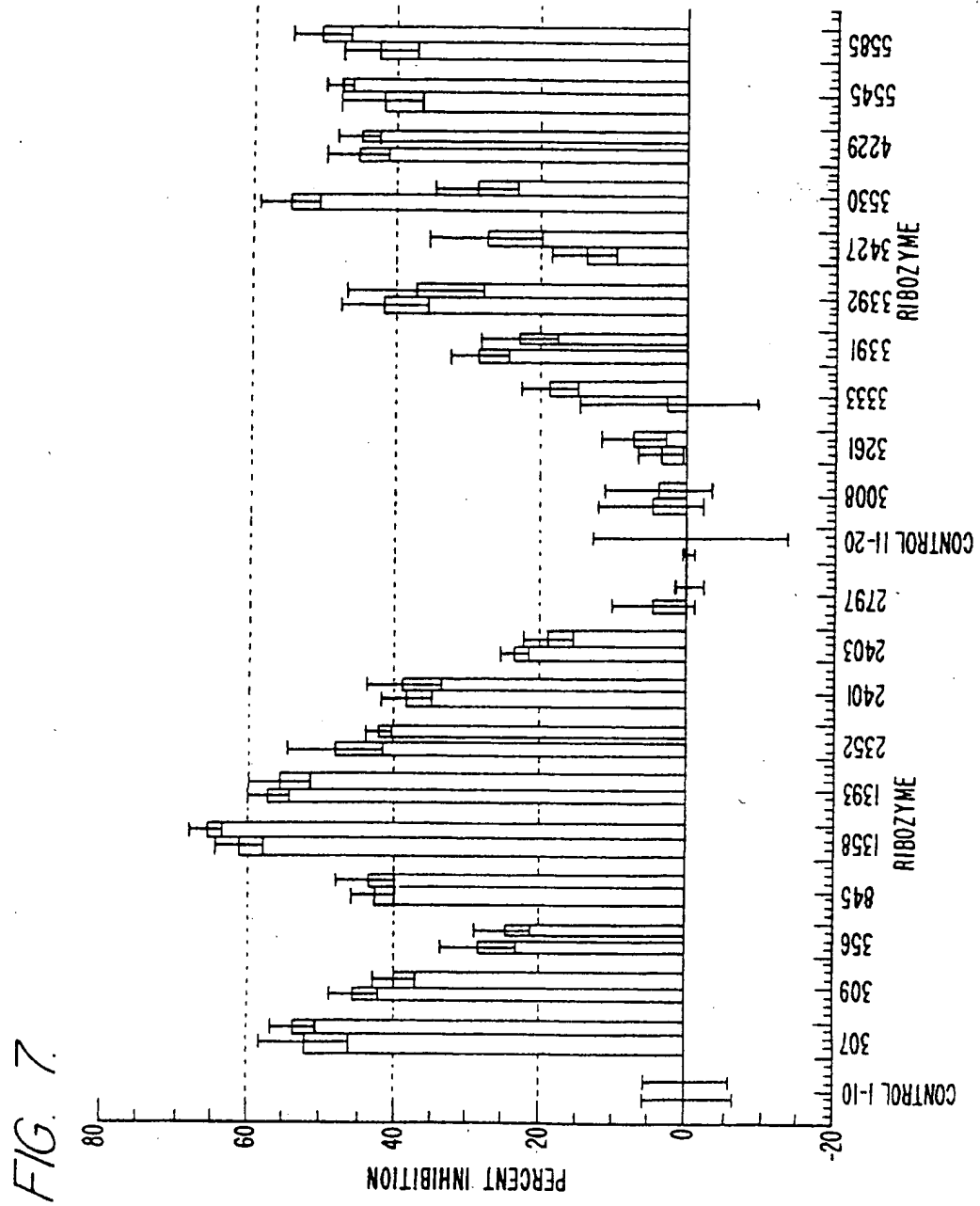
FIG. 5.

6/20

FIG. 6.

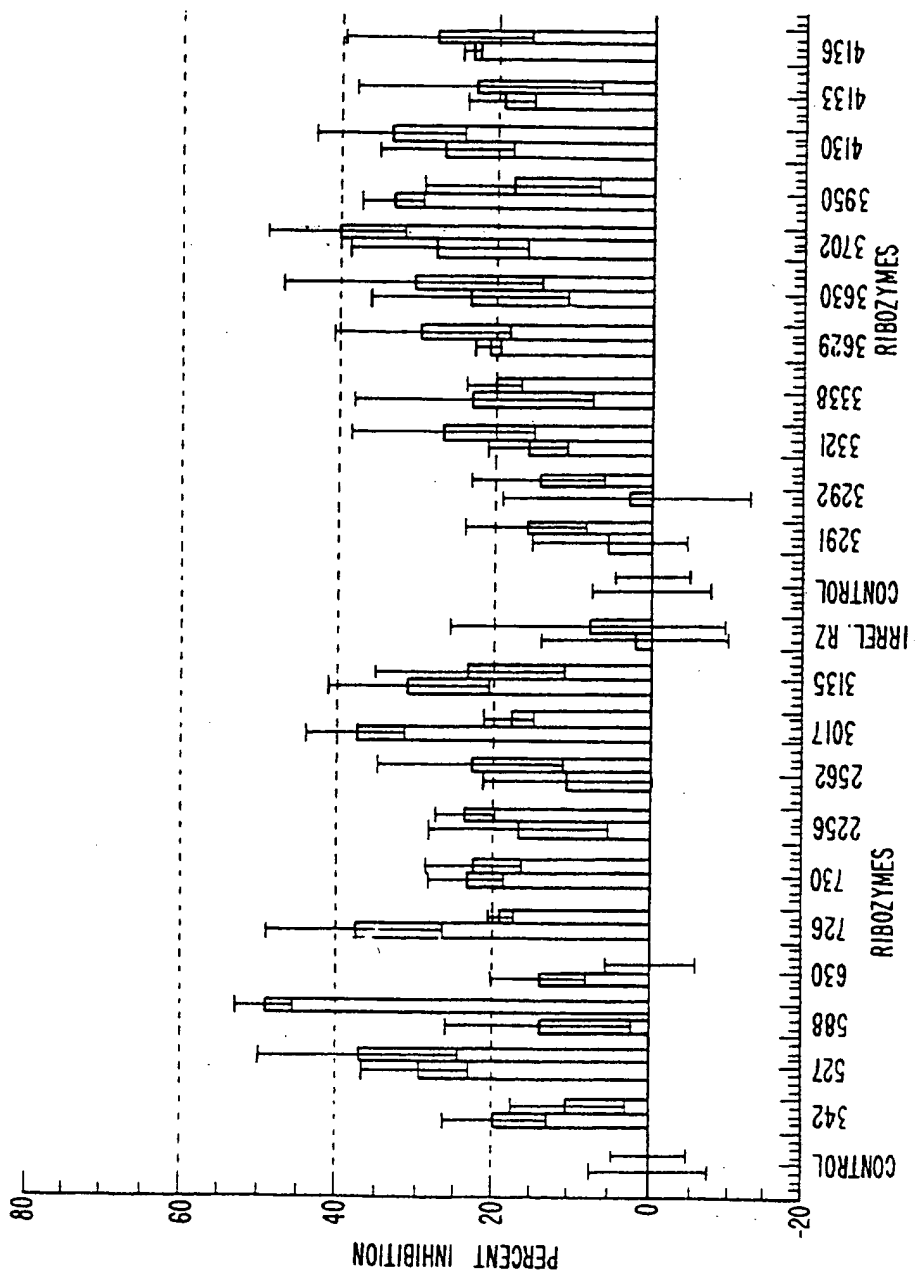


7/20



8/20

FIG. 8.



9/20

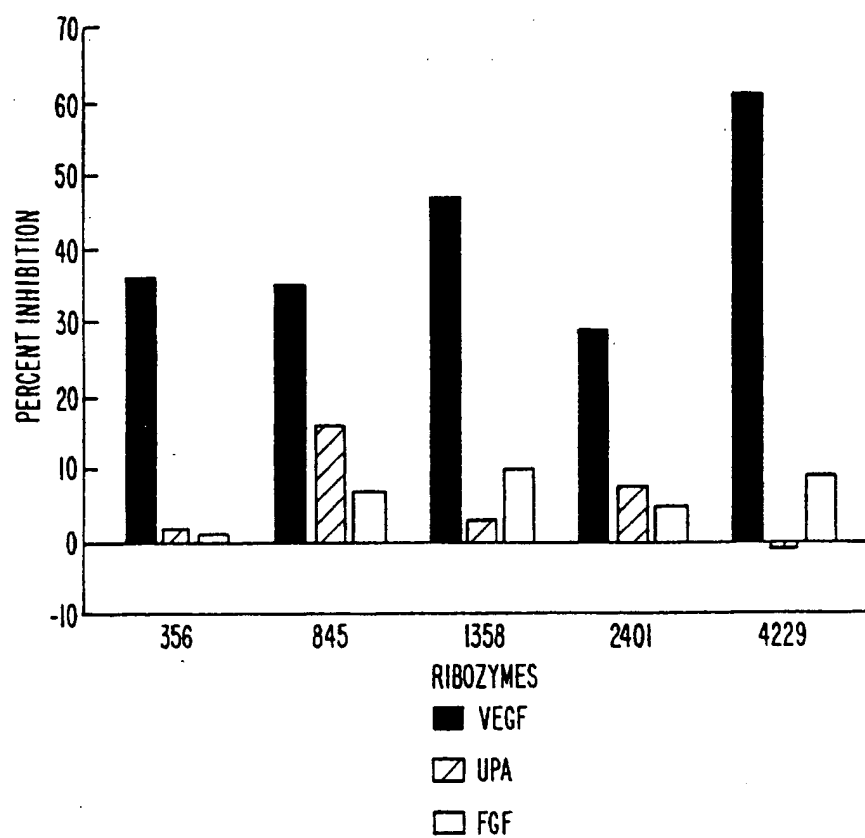
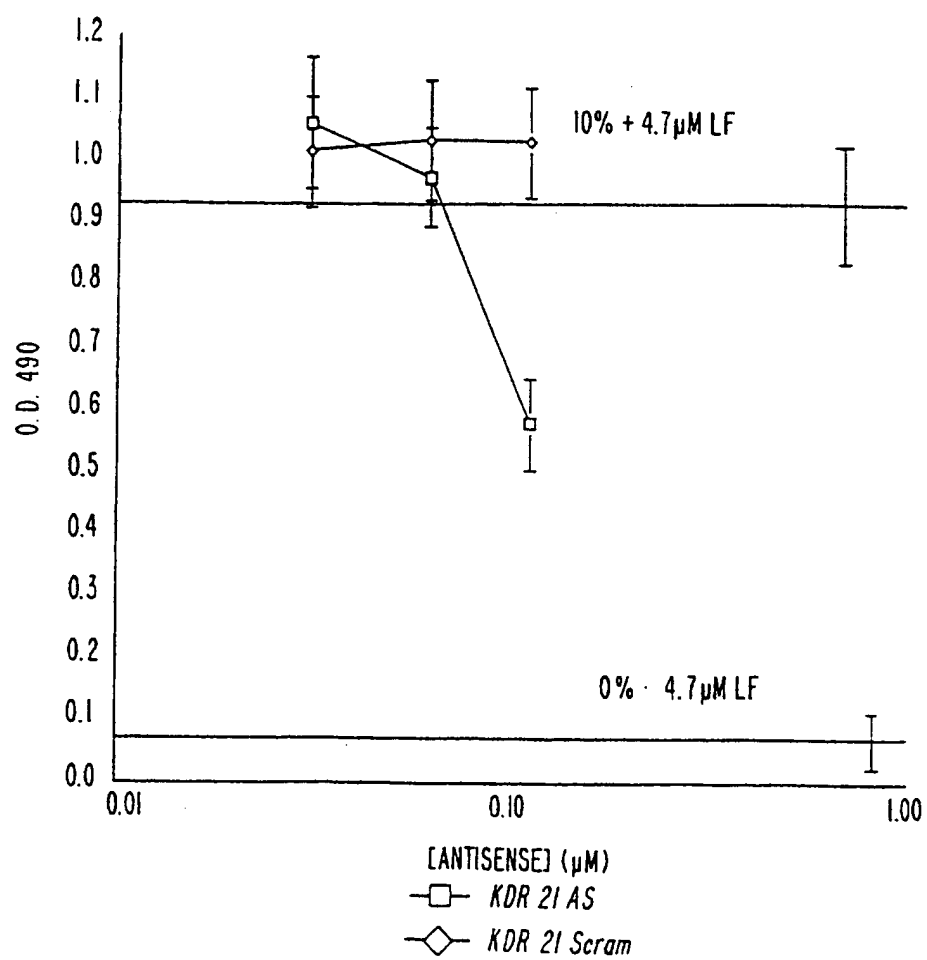
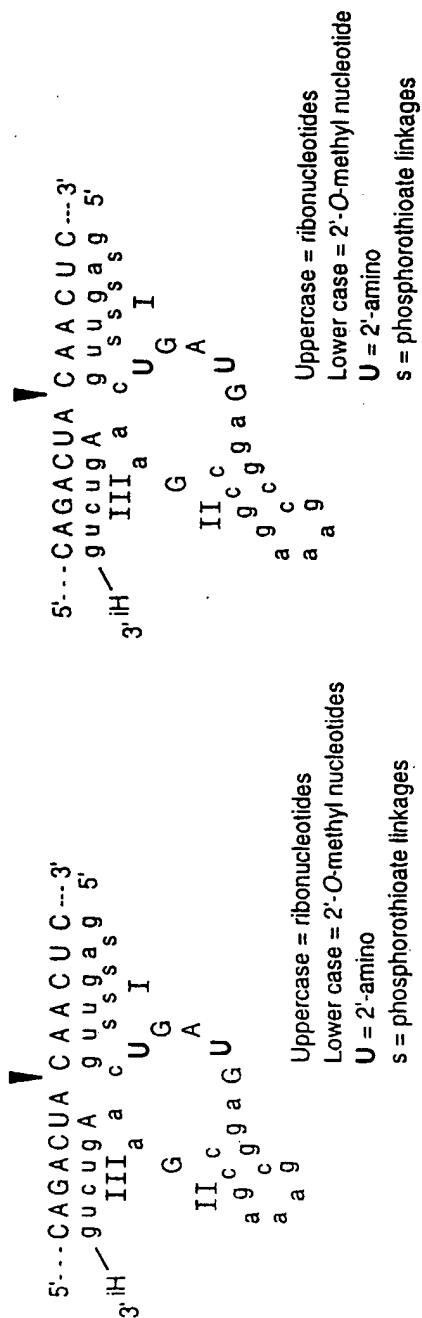
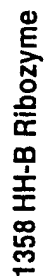


FIG. 9.

10/20

FIG. 10.





4229 HH-B Ribozyme

FIG. 11A.

12/20

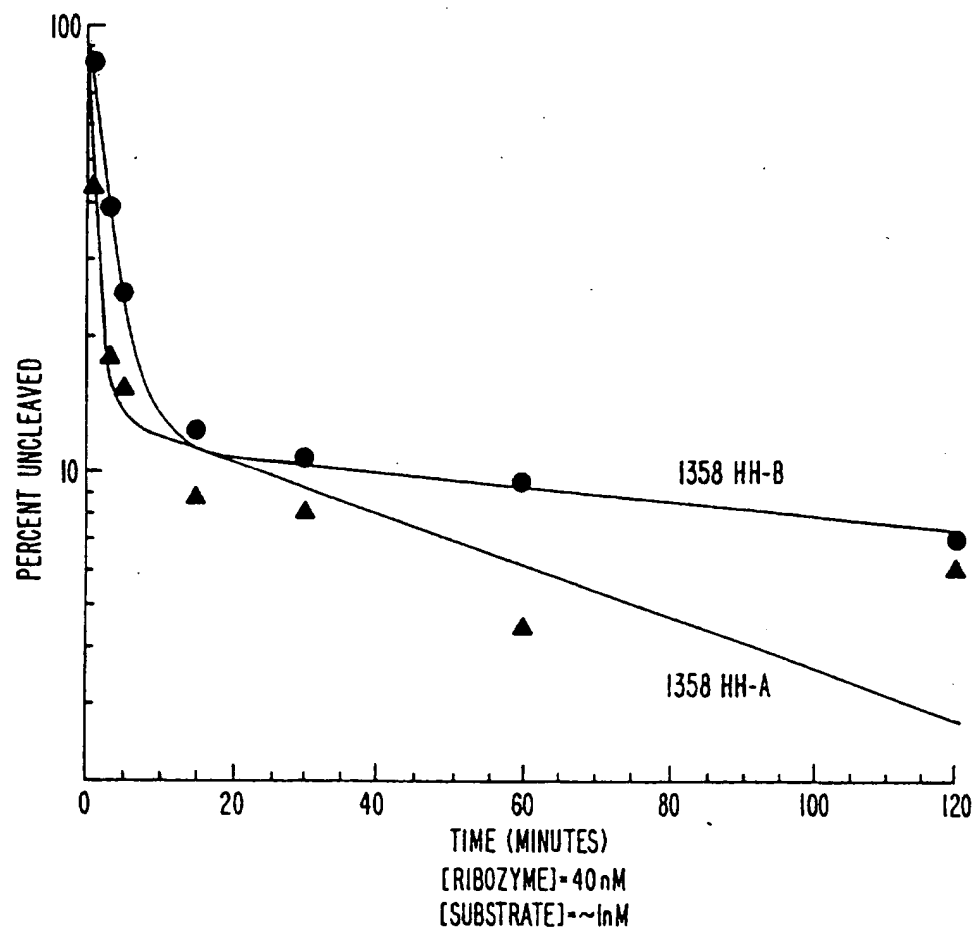
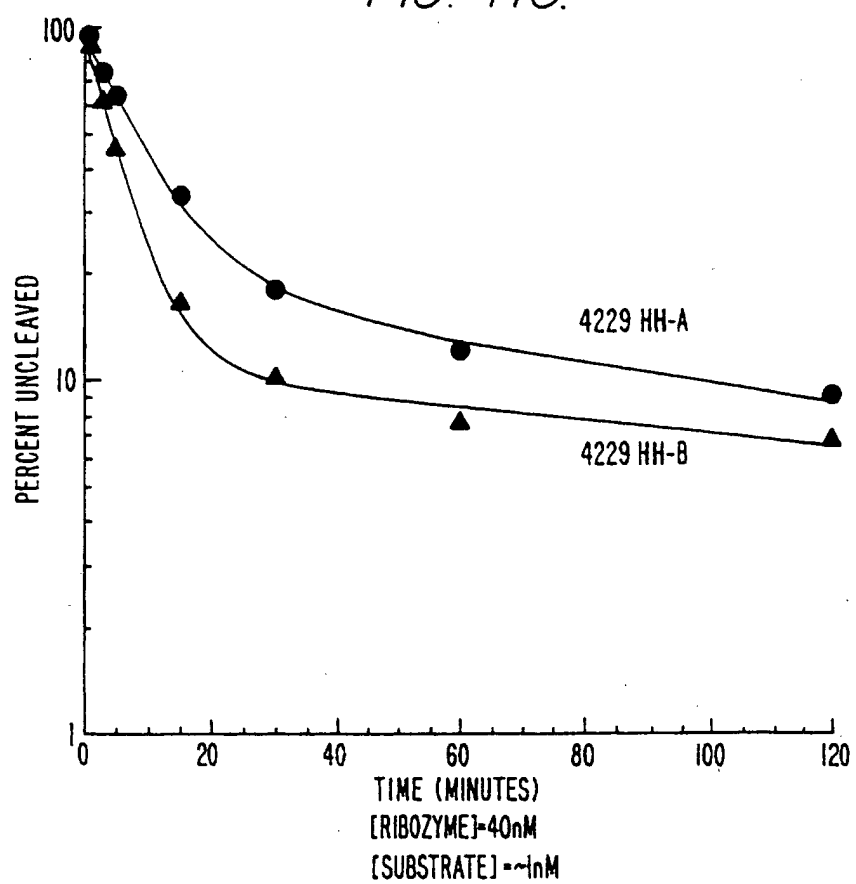


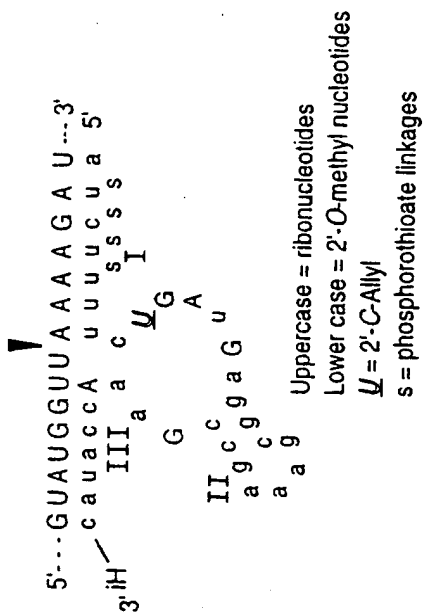
FIG. 11B.

13/20

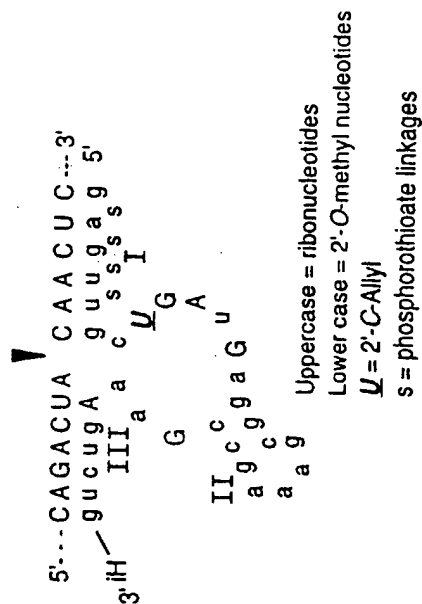
FIG. 11C.



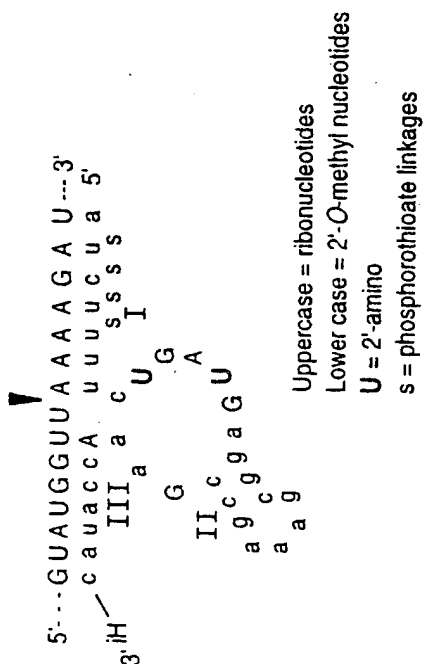
14/20



1358 HH (2'-C-Allyl) Ribozyme



4229 HH (2'-C-Allyl) Ribozyme



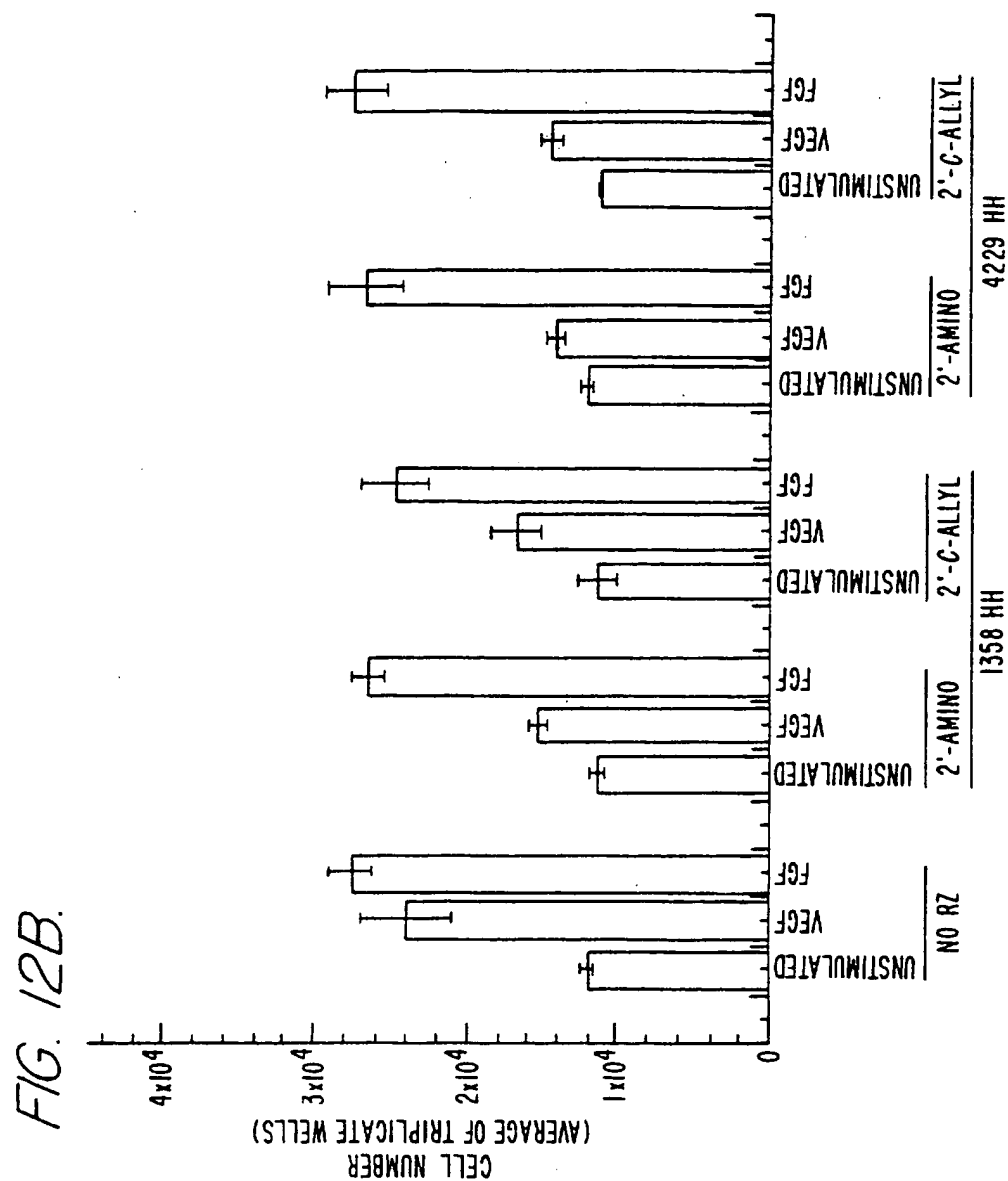
1358 HH (2'-Amino) Ribozyme



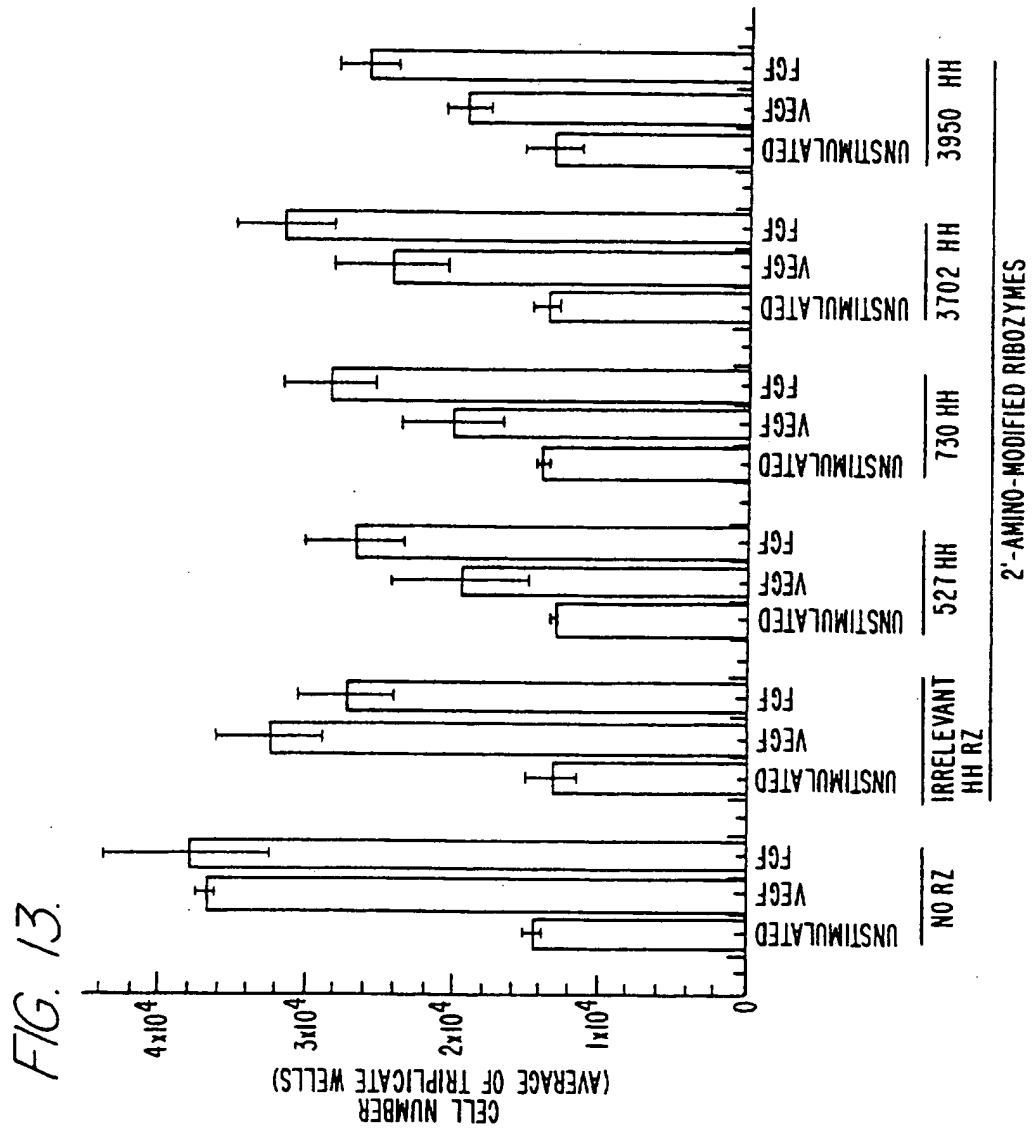
4229 HH (2'-Amino) Ribozyme

FIG. 12A.

15/20



16/20



17/20

FIG. 14.

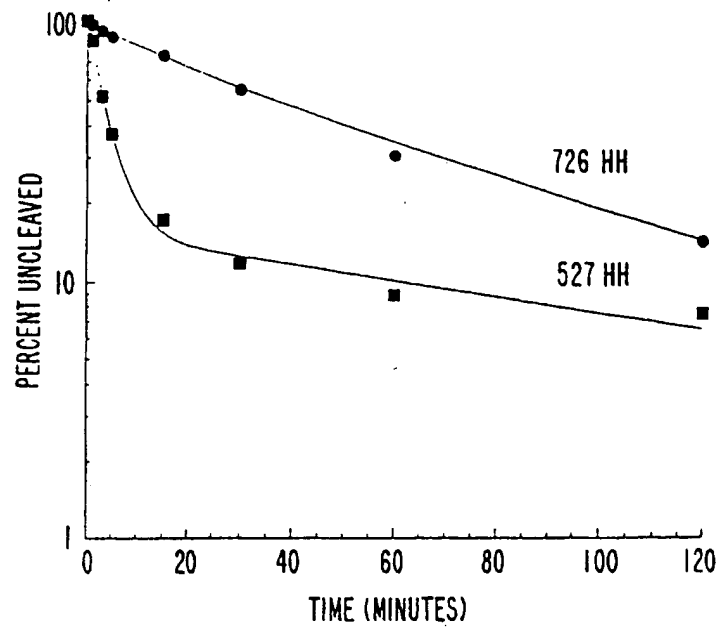
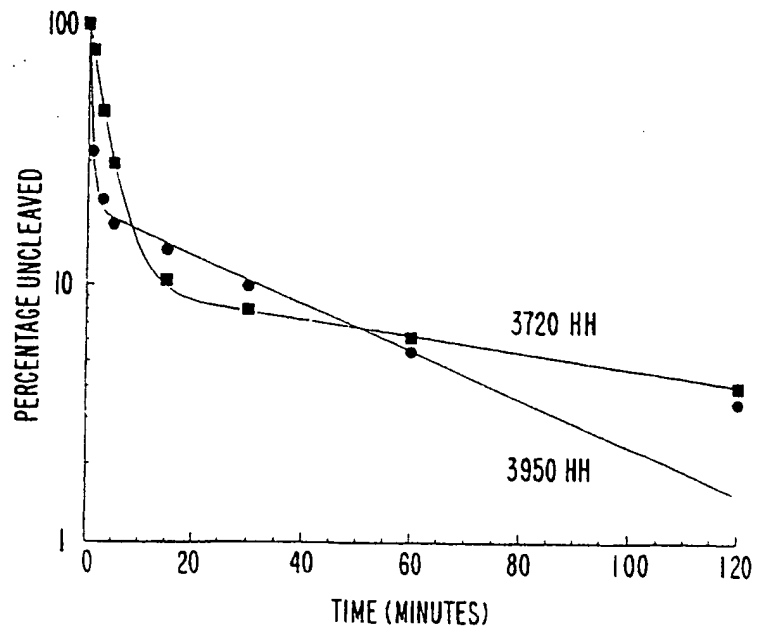
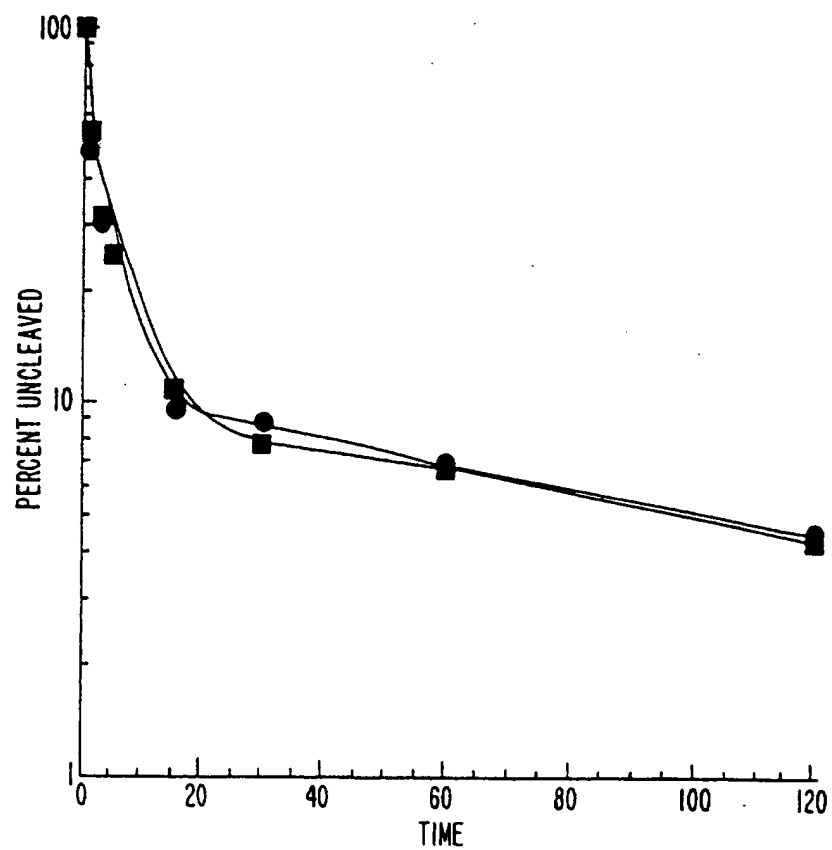


FIG. 15.



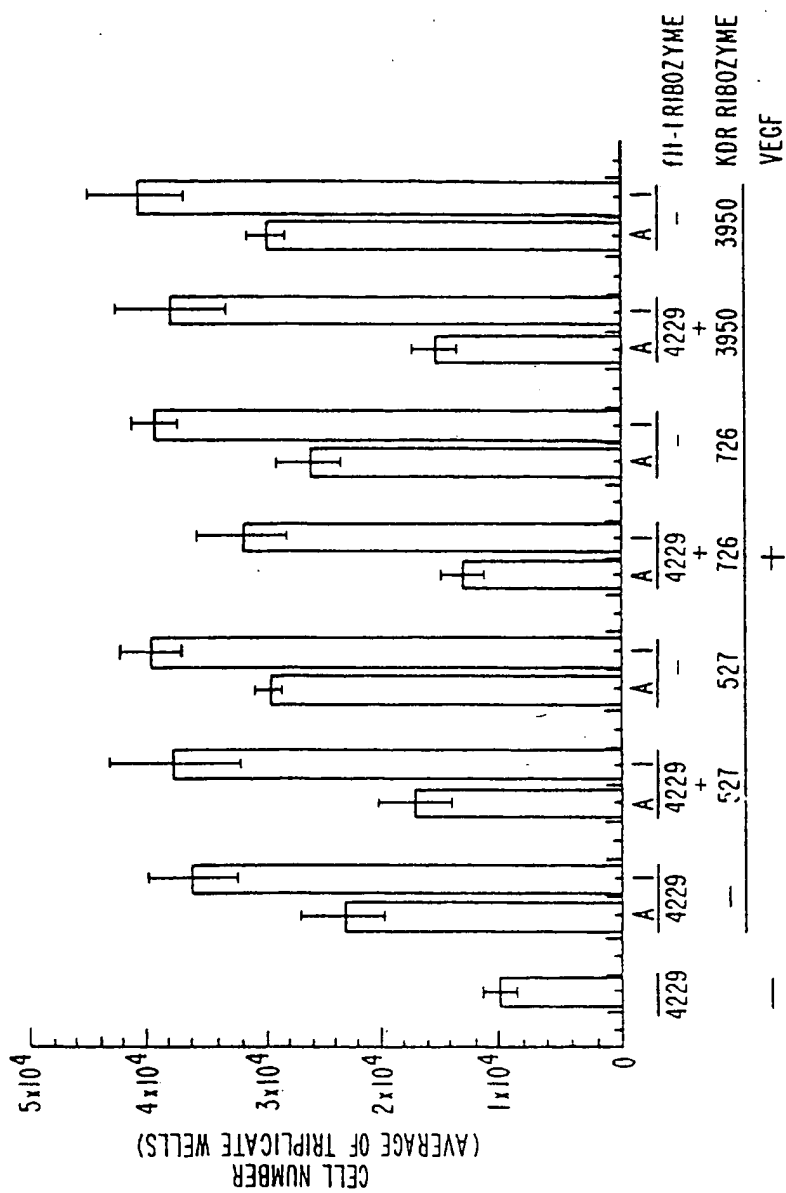
18/20

FIG. 16.



	STEM II
■	3bp
●	4bp

FIG. 17.



20/20

FIG. 18.

